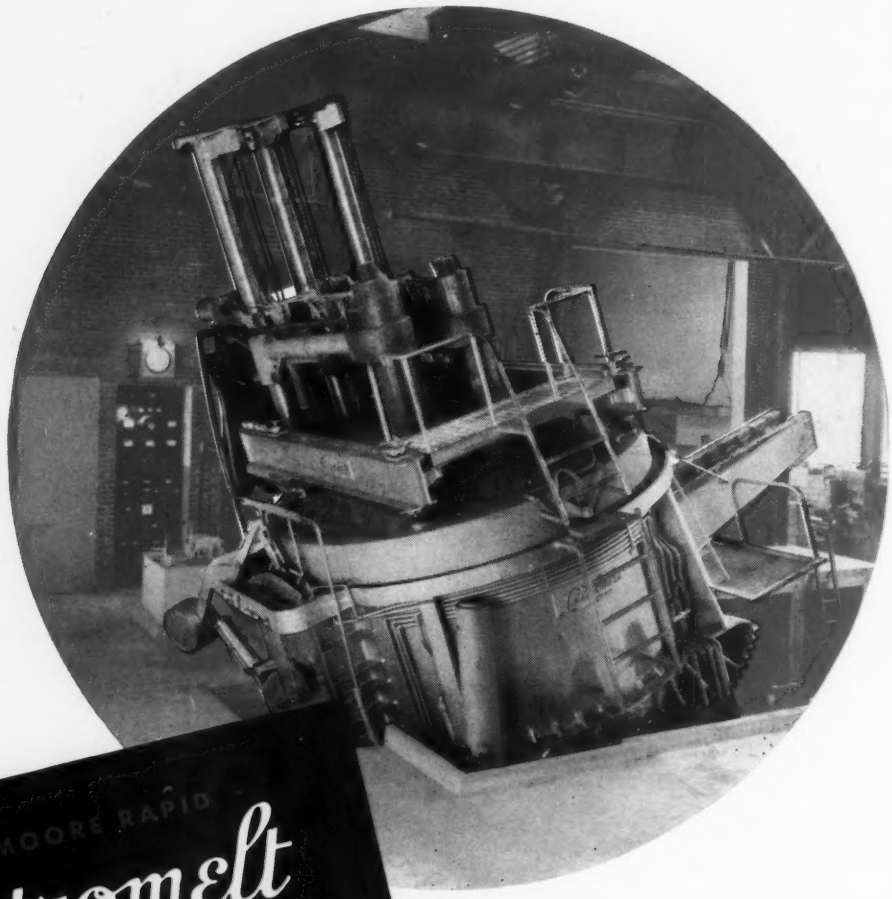
American Foundryman

JUNE 1947

★ THE FOUNDRYMEN'S OWN MAGAZINE

Flexibility is economy



Size "OT" Lectromelt furnace tilted backward in slagging position.

MOORE RAPID

Lectromelt

FURNACES

For large heats, small heats or divided heats—for ordinary irons and steels or for alloys—Lectromelt furnace does the job. The heats are quick, the analyses more easily controlled. Flexibility such as this provides real economy, makes Lectromelt ideal for shops requiring a large variety of castings or ingots.

Write today for complete details.

MANUFACTURED IN
ENGLAND . Birlec, Ltd., Birmingham, FRANCE . Stein et Roubaix, Paris, SPAIN . General Electrica Espanola, Bilbao

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH, . . 30 . . PENNA.

A.F.A.
NATIONAL OFFICERS

PRESIDENT
*S. V. Wood
Minneapolis Electric Steel Castings Co., Minneapolis

VICE-PRESIDENT
*Max Kuniansky
Lynchburg Foundry Co.
Lynchburg, Va.

NATIONAL DIRECTORS

Term Expires 1947

Frank J. Dost
Sterling Foundry Co.
Wellington, Ohio

S. D. Russell
Phoenix Iron Works
Oakland, Calif.

R. T. Rycroft
Kencroft Malleable Co., Inc.
Buffalo, N.Y.

*Joseph Sully
Sully Foundry Div.,
Neptune Meters, Ltd.,
Toronto, Ont.

*L. C. Wilson
1220 Parkside Drive
Reading, Pa.

*Fred J. Walls
International Nickel Co.
Detroit

Term Expires 1948

G. K. Dreher
Foundry Educational Foundation
Cleveland

E. W. Horlebein
Gibson & Kirk Co.
Baltimore, Md.

H. H. Judson
Standard Foundry Co.
Worcester, Mass.

*Jas. H. Smith
Central Foundry Div.,
General Motors Corp.,
Saginaw, Mich.

F. M. Wittlinger
Texas Electric Steel Casting Co.
Houston, Texas

Term Expires 1949

H. A. Deane
American Brake Shoe Co.
New York

J. E. Kolb
Caterpillar Tractor Co.
Peoria, Ill.

H. G. Lamker
Wright Aeronautical Corp.
Paterson, N. J.

B. L. Simpson
National Engineering Co.
Chicago

S. C. Wasson
National Malleable & Steel Castings Co., Chicago

Members, Executive Committee

A.F.A. HEADQUARTERS
ROOM 1198, 222 W. ADAMS ST., CHICAGO 6.

Wm. W. Maloney, *Secretary-Treas.*
S. C. Massari, *Technical Director*
F. E. Wartgow, *Exhibits Dept.*
H. F. Scobie, *Educational Asst.*
Jos. E. Foster, *Technical Asst.*
G. R. Buhler, *Editorial*
C. R. McNeill, *Editorial*
G. A. Whittington, *Staff Asst.*
Terry Koeller, *Advertising Mgr.*
LeRoy Barfuss, *Art Director*

CONTENTS

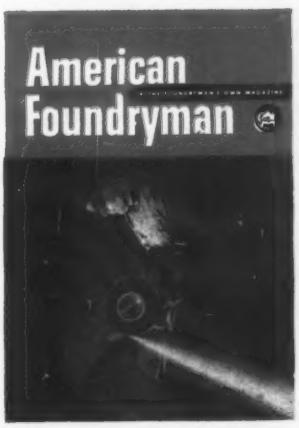
Published In Two Sections—SECTION 1 *VOLUME XI, NUMBER 6*

American Foundryman

June, 1947

Official publication of American Foundrymen's Association

21 **Correlate Light Metals Data For Design Engineers:** R. E. Ward
22 **Foundry Grinding Wheels, Manufacture and Use:** C. A. Carlson
30 **Practical Vocational Guidance:** O. E. Lawson
34 **Molding Sands, Physical Properties:** G. R. Gardner
39 **Aluminum Sand Castings Alloys, Effect of Room Temperature Intervals Between Quenching and Aging:** R. A. Quadt
44 **Finishing and Inspection, Mechanized Malleable Foundry:** D. F. Sawtelle
48 **Assume Leadership of A.F.A. Technical Divisions**
51 **New Process Chemically Treats Molding Sand:** T. W. Curry
57 **Gates and Risers, Calculation of Sizes:** Nathan Janco
61 **Mexican Foundries:** Dr. R. L. Lee
63 **Foundry Personalities**
65 **New Members**
67 **Foundry Firm Facts**
68 **Chapter Officers**
69 **Chapter Activities**
80 **Who's Who**
82 **New Foundry Products**



The American Foundrymen's Association is not responsible for statements or opinions advanced by authors of papers printed in its publication.

This Month's Cover

A highly flexible grinding unit is this high speed portable machine (*Foundry Grinding Wheels,* by C. A. Carlson, p. 22 of this issue). These units are electric or air driven, and mount straight or shaped wheels.

Published monthly by the American Foundrymen's Association, Inc., 222 W. Adams St., Chicago 6. Subscription price, to members, $4.00 per year; to non-members, $6.00 per year. Single copies, 50c. Entered as second class matter July 22, 1938, under the Act of March 3, 1879, at the post office, Chicago, Illinois. Additional entry at Ann Arbor, Mich.

uniform ingot HELPS ASSURE uniform castings

The skill of your foundrymen in the production of castings will count for little, unless you start them off with metal on which they can place reliance. You can be sure that with Michigan Smelting Brass or Bronze ingot your specifications have been adhered to and that the ingot will be of uniform composition throughout your entire order.

MICHIGAN SMELTING & REFINING

Division of **BOHN ALUMINUM AND BRASS CORPORATION**

GENERAL OFFICES—LAFAYETTE BUILDING, DETROIT 26, MICHIGAN

NON-FERROUS SCRAP METAL REFINERS FOR OVER 50 YEARS

CORRELATE LIGHT METALS DATA FOR DESIGN ENGINEERS

COGNIZANT OF the prominence light metals have attained in post war industry, the American Foundrymen's Association's Aluminum and Magnesium Division is striving to produce, through correlation and research, comprehensive information on light metal foundry practice and applications of aluminum and magnesium castings.

The first major project, recently completed, was to bring up-to-date the "recommended practices" for both aluminum and magnesium sand castings. This work, first issued when the Aluminum and Magnesium Division was still a part of the Non-Ferrous Division, proved extremely valuable during the war period. The recent revisions incorporate the knowledge gained during that period. Complementing these, the RECOMMENDED PRACTICES ON PERMANENT MOLD CASTINGS AND DIE CASTINGS, the first of their kind, were presented at the Golden Jubilee Foundry Congress.

Using today's light metal foundry equipment, techniques and alloys, the field of application of light alloys has expanded tremendously, and has now become competitive from both an engineering and cost standpoint in many applications where formerly either ferrous or other non-ferrous alloys were used. Aware of this and realizing also that many industries are not entirely familiar with the engineering properties and applications of the light alloys, our division is now endeavoring to provide this information.

The Committee on Alloy Recommendations is compiling data on all commonly used aluminum and magnesium alloys, indicating their physical properties and showing relatively such characteristics as corrosion resistance, castability, machinability, and weldability. The relationship between these alloys and ferrous and other non-ferrous types commonly in use will also be shown. Although relative costs are equally necessary, present fluctuations will undoubtedly prevent the presentation of any cost comparisons.

The Committee on Casting Design and Stress Analysis has presented and are preparing papers reporting the effects of casting design on the properties of the finished casting. The final result of this work will undoubtedly be a comprehensive report on design recommendations, which, in conjunction with the report on alloy recommendations will provide the design engineer and foundryman with a very worthwhile reference. These references, it is hoped, will materially benefit the foundryman by providing the design engineer with helpful information written by foundry engineers, thus aiding the designer to create castings which will have the desired properties and can be made readily in the foundry.

The Research Committee, operating under the new A.F.A. research plan, has presented a proposal for research on a fundamental study of the flow of metal in molds, which, if approved, should be the foundation for a thorough scientific understanding of light metal foundry practice.

In addition to the above projects, the division is working on centrifugal castings, test bar procedures, and the light metal section, CAST METALS HANDBOOK.

R. E. WARD, *Chairman*
Aluminum and Magnesium Division
AMERICAN FOUNDRYMEN'S ASSOCIATION

R. E. WARD, Chairman, Aluminum and Magnesium Division, is chief metallurgical engineer, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N.J. He attended and was graduated from Newark College of Engineering, Newark, N.J., in 1938. Joining the Eclipse-Pioneer Division in the same year, he held the positions of metallurgical engineer and assistant chief metallurgical engineer before assuming his present duties.

FOUNDRY GRINDING WHEELS

MANUFACTURE AND USE

Carl A. Carlson
Sales Engineer
Norton Co.
Worcester, Mass.

AMONG THE FIRST INDUSTRIES to use an artificial abrasive was the foundry. The first artificial abrasive developed was silicon carbide, which is particularly well suited for grinding cast iron.

Silicon carbide is composed of silicon and carbon. The materials used to produce it are pure silica sand and carbon in the form of coke. These common materials, when subjected to the high temperatures of the electric furnace, react with one another to form the abrasive crystals which have achieved such great industrial importance. Silicon carbide is extremely hard, but of moderate toughness, and in breaking its particles are angular in form. Another widely used abrasive is aluminum oxide which is slightly lower in hardness but tougher than silicon carbide. The material used to produce this abrasive is bauxite, a clay-like ore.

Electric furnaces used for the manufacture of aluminous abrasives are of the arc type with numerous modifications, the bauxite being purified during the operation by the reduction and separation of the accompanying impurities. Both the chemical composition and the manner of crystallization have an important bearing upon the abrasive qualities, which can be varied within rather wide limits, and are controlled to conform to the ultimate uses of the abrasive materials.

Processing Crude Abrasive

Preparation of all abrasives, following electro-chemical fusion, is as follows: after being rough crushed to smaller pieces, the crude abrasive is delivered to the abrasive mill where it is further reduced to sizes suitable for use in abrasive wheels, sharpening stones, and refractories by a variety of well-known crushing methods. The material is passed through washers to remove dust, dirt and foreign material, and then dried.

A line of swing-frame grinders. Note exhaust method.

View of large floor-stand grinder in operation.

The grains are graded by being passed over a series of vibrating screens. Standard grain size numerals range from 8 to 600. Each designation refers to the "mesh" of the screen through which that particular grit passes. For example, No. 24 grit is that which passes through a screen having 24 meshes per inch, and is retained on a screen having 30 meshes per inch. The finer sizes, 280 to 600, are classified hydraulically.

Bond Material

Bond is the material in a grinding wheel which cements the grains of abrasive together. Bond is not an abrasive, but a binder to support the abrasive grains. The grades run from A, the softest, to Z, the hardest. Bond mixtures are of five general types: vitrified, resinoid, rubber, shellac and silicate.

The vitrified wheel has several qualities which make it preferable for much of the grinding done. Because of its porosity and strength of bond, the material removed per cubic inch of wheel wear is high. It is not affected by water, acids, oils, climatic or ordinary temperature conditions.

Resinoid bond is used for the majority of high-speed wheels in foundries. The rate of stock removal generally is in direct proportion to the speed, and resinoid bonded wheels are designed to operate at 9500 surface feet per minute, while vitrified bonded wheels run at a slower speed of 6500 surface feet per minute.

Rubber bond is used for thin wheels requiring a maximum of strength against shocks. Typical operations are cutting off and cleaning out in narrow places. They are also used for special finish work.

Shellac bond is used where the nature of the work demands wheels which generate the least grinding heat. Shellac wheels have a limited use for grinding aluminum castings.

The most essential factors to be considered in selecting a grinding wheel for a given job are: (1) Material to be ground; (2) amount of stock removed, accuracy and finish required; (3) area of contact; (4) type of grinding machine. The type of abrasive is largely determined by the properties of the material to be ground.

Generally speaking, aluminum-oxide wheels are more suitable for use on materials of high tensile strength, i.e., where the material is neither brittle nor easily penetrated. Such materials range from hard, tough, alloy steels to the tougher varieties of alloyed bronze and aluminum.

Silicon-carbide wheels are most efficient on materials of lower tensile strength, such as cast iron, hard malleable iron, soft brasses, aluminum, copper and magnesium.

Coarse grains and soft grades are used for fast removal and large contact areas. Fine grains and harder

Left to right—Horizontal disc grinder; small portable grinder in a vise; large floor-stand grinder.

grades are used for narrow contacts and to hold the wheel shape, and also where good finish is desired.

To help grinding action and prevent loading, a "treatment" can be used. The wheels may be impregnated with one of several fillers available. These fillers are designed to melt at a certain temperature and are selected with proper regard for the severity of the grinding operation.

Grinding Machines

In the jobbing foundry, the machines and wheels must be of general utility. Floor stands mounting 20, 24 or 30-in. wheels of medium-hard grade are used. Benchstands using stubs of the larger wheels and thinner, smaller wheels are used for special grinding operations on smaller castings. On production work, the larger the wheels the better the economy.

Portable grinding machines, electric or air driven, are being used more extensively. The wheels are either straight 6 or 8-in. diameter, ½ to 1 in. thick. Also used are shaped wheels such as 6-in. cup wheels or different sizes of cone wheels. It is advisable to have an assortment of these shaped wheels on hand to take care of any job that might come up. Small machines with mounted points or wheels are also used for many operations.

Cutting-off machines are used to cut heads and risers, mostly on non-ferrous castings but also for hard and heat-resistant alloys. The greatest advantage is in the saving of time, and castings can be cut sufficiently close to eliminate the necessity of further grinding.

Disc grinders are used to generate flat surfaces to exact dimensions and with good finish. Both horizontal and vertical disc machines are used. Horizontal machines usually employ large discs on which more than one casting can be ground at the same time. Vertical machines are used for greater accuracy and sometimes for semi-automatic production work.

On certain castings it has been found necessary to use large feeders. Grinding wheels mounted on swing-frame machines are most practical for grinding off feeders and smoothing the castings. Swing-frame machines are superior when a large amount of material is to be removed.

In grinding steel castings on floor stand, swing frame and portable grinders, resinoid bonded wheels generally are used. It is important to use resinoid bonded wheels at proper speed (9500 surface feet per minute), and it is equally important not to use wheels at speeds higher than recommended.

Casual observation of snagging is not likely to suggest that such a rough-grinding operation would lend itself to scientific analysis. Irregular shape and condition of the work, noise and vibration present would seem to defy classification of causes and effects. Even laboratory tests, under closely controlled conditions, are subject to substantial "experimental errors."

However, by application of the law of averages to re-

sults from many tests of the same nature, and by comparison of averages with known laws of mechanics, certain economy principles are made evident. Often a single trial will not demonstrate a potential saving because of unforeseen complications. On the whole, however, there is always the chance of lowering grinding costs when we have an accurate understanding of fundamentals, and especially when the problem is studied in its entirety.

To effect economy with a given grinding wheel, two important mechanical factors must be controlled: (1) wheel speed, and (2) grinding pressure. Increase in either or both of these factors generally will increase the economy of snagging.

Wheel Speed—From a simple geometrical consideration, the amount of material removed from the work under constant grinding pressure is the same on the average for each revolution of the wheel. Therefore, rate of cut is proportional to surface velocity of the wheel. In practice and within limits, rubber and resinoid wheels approach a fulfillment of this geometrical prediction. This also is true of vitrified wheels, but within the narrower limits imposed by their lower operating speeds.

Safety is the most important limit of high wheel speed. Maximum safe speed depends upon type of bond, bonding strength in the wheel and character of machine. Practical maximum speeds are 6500 surface feet per minute for vitrified snagging wheels, and 9500 for the rubber and resinoid types.

Comparative Grinding Costs

Grinding Pressure—The general effect of greater pressure is a higher rate of cut and also of wheel wear, but still in such order as to lower total grinding cost. Improved economy is thought to be due to broader contact. The face of a snagging wheel usually is rounded. More pressure sinks it further into the work and thus broadens contact. The advantage due to higher pressure is positive as higher production is obtained.

Practical limits in going to higher pressures are fatigue of operator, danger of wheel breakage and work requirements. Pressure must be kept sufficiently low to allow the operator complete control of the operation.

In general, the discussion is intended to be a statement of some of the principles which are the foundation of economy in snagging. They apply mainly to cases in which substantial amounts of metal are removed from the work. There are a few jobs on which increased rate of cut is of little or no advantage in speeding production. For example, if a piece of work requires only light grinding and if, for some reason, the work cannot be moved through the foundry more rapidly, a faster cut would not save time but could waste metal.

It is difficult, if not impossible, to generalize the grinding operations in foundries. Each foundry has its own problems which vary from time to time and with the different kinds of work coming through.

After wheels with satisfactory grinding action have been found, it is sometimes difficult to show in figures the advantages of one wheel compared with another, and to determine just how much two different wheels vary the cost of grinding. If one type of wheel lasts considerably longer and grinds as fast as the wheels previously used, there is no question but that the new wheels effect a saving, but if the wheels grind faster with equal or less life, it may be necesary to investigate more carefully to determine the actual grinding cost with the different wheels. All of the different items which make up the total grinding cost should be reviewed, namely, wheel cost, labor cost and, last but not least, overhead cost.

Wheel Cost

If the wheel is used to discard size during the test, the total cost of the wheel can be entered, but if the grinding wheel is only partially used it will be necessary to calculate the portion used. This can be done in two ways—on the basis of wheel consumption by weight, or wheel consumption as measured by volume of wheel structure lost. First, obtain the value of abrasive used during a limited test by the loss in weight. Weigh the full-size wheel and then a wheel stub worn to discard size to determine the pounds of usable abrasive and the cost per pound.

Full-size wheel weight, lb.	100
Discarded wheel weight, lb.	30
Usable abrasive, lb.	70
Wheel cost, total	43.86
Usable abrasive cost per lb.	0.626

The second method is to figure the wheel cost on the basis of cubic inches of abrasive lost in the test. To establish cost per cubic inch of usable abrasive, find the cubical content of a full-size wheel and subtract the cubic inches when at discard size. Then divide the total wheel cost by the number of usable cubic inches.

Full size 24×3-in. wheel, cu. in.	1357
Discarded 15×3-in. wheel, cu. in.	530
Usable abrasive, cu. in.	827
Wheel cost, total	43.86
Usable abrasive cost per cu. in.	0.053

Labor cost may vary from piece work or bonus to straight day rate, and may run between $0.75 and $1.50 per hour, depending upon the kind of work done and skill required.

Wheel cost and labor cost are known factors, but overhead cost is not quite so tangible and may vary a great deal depending upon the kind of machine used and the importance of the operation as a step in a line production. Where actual figures have been obtained, the overhead costs have varied from $0.50 to $1.25 per man hour for men on swing-frame machines and floor stands doing production grinding, and from $0.25 to $0.50 an hour for men on smaller machines such as portable grinders and bench stands.

Cost of Grinding per Unit of Work

After the total cost of grinding has been established for the duration of test with each wheel, a yardstick is required in order to judge comparative performance of the wheels. Several measuring units may be used for this purpose:

1. Pounds of material removed.
2. Number of identical pieces ground.
3. Tons of castings or billets processed.
4. Using the wages earned during the test as a measure of work done.

The most accurate method is to actually weigh the material removed, but if this is difficult the number of identical pieces ground by each wheel furnishes a good comparison unit.

In longer tests, and particularly where several wheels of each specification are used, the total weight of castings or billets ground will give a good indication of comparative performance, as well as the actual grinding costs to be expected in the long run from each kind of wheel tried.

When the operator's earnings are used as a unit of comparison between wheels of equal cutting ability, the longest lasting wheels will, of course, be best. In cases where the operator earns as much in less time, as would be true with a faster cutting wheel, the resulting overhead is less, and it can thus be demonstrated mathematically that such a wheel usually is most economical.

As illustrations * of the different methods, the following examples are cited:

Swing-Frame Grinding		
Wheel wear—6 lb @ 0.626	3.76	
Labor—3 hr @ 1.25	3.75	
Overhead—3 hr @ 1.00	3.00	
Total grinding cost		10.51
Material removed, lb	100	
Grinding cost per lb material removed		0.1051
Floor-Stand Grinding		
Wheel wear—150 cu. in. @ 0.053	7.95	
Labor—15 hr @ 1.00	15.00	
Overhead—15 hr @ 0.50	7.50	
Total grinding cost		30.45
Identical pieces ground	750	
Grinding cost per piece		0.04
Portable Grinding		
Wheel wear—3 wheels @ 2.76	8.28	
Labor—24 hr @ 1.00	24.00	
Overhead—24 hr @ 0.40	9.60	
Total grinding cost		41.88
Castings ground per test, tons	9	
Grinding cost per ton		4.65
Floor-Stand Grinding of Implements		
Wheel cost—1 wheel @ 43.86	43.86	
Labor cost (earnings)	50.00	
Overhead—40 hr @ 0.75	30.00	
Total Grinding Cost		123.86
Grinding cost per dollar earned		2.48

One or the other of the foregoing methods can be used for short comparative tests, but to obtain still more accurate figures it is advisable to "check test" with a larger quantity of the wheels found best in the first test. It will then be possible to compare the results against average costs for a longer period.

Quite often the cost of grinding is not segregated from the total cleaning cost in the monthly cost sheet. It probably is not too difficult to make a breakdown of the figures and to find out how many wheels of the different sizes were used during the preceding month.

The labor cost for grinding is available, particularly if piecework prices are paid. If the grinding machine operators also work as laborers in the foundry, that part probably is kept separate.

For the purpose of setting sales costs, most foundries have established an overhead cost per man hour for the different operations. With these figures available, it is a small matter to check the grinding cost per ton from month to month.

* Figures shown are for purposes of illustration only.

The main reason for obtaining these figures is to see that the grinding cost is kept within reasonable limits, and also to be sure that low cost is not obtained at the expense of inferior work. It may be found that high grinding costs are the result of less careful handling in operations prior to grinding.

The machinery to determine monthly grinding cost per ton ground or shipped should be set up in such a manner that it will not throw much additional burden on operators, supervisors or office force.

Operation of machinery is attended with risk. The trend of public sentiment, the attitude of industries in the design of machines in recent years, has been toward more protection and safety. The same fundamental principles of safety which apply to other industrial operations, namely, protection of the operator by mechanical means and educating him to observe the proper precautions, also apply to grinding operations.

To obtain the best work and most economical results, the grinding machines must be kept in good condition. The speed should be checked at regular intervals, and changed if need be to correspond to the wheel manufacturer's recommendations. The machines should have plenty of power to prevent slowing down under working pressures. Machines running too slowly or with insufficient power will waste abrasive material and cause higher grinding costs.

Grinding machines should be designed for stability and rigidity to prevent vibration. The spindle end, both nut and flanges, should be protected by properly designed hoods. In addition to the usual protection devices for belt guarding, dry grinding machines should be provided with hoods connected to an exhaust system.

The greatest care should be taken in the mounting of a wheel. The hole in the wheel should be slightly larger than the spindle or arbor so that it is not neces-

Small portable grinders at work on intricate castings.

sary to use force when mounting the wheel. Wheels should always be mounted with flanges made in accordance with the specifications laid down in the "Safety Code for the Use and Care of Abrasive Wheels" as adopted by the American Standards Association. This booklet is available upon request.

The inner and outer flanges should be exactly the same diameter. They should run prefectly true, the inside flange should be fixed to the spindle, and the hole in the outer flange should be an easy, sliding fit on the spindle or arbor. Compressible washers, the diameter of which shall not be smaller than the flanges, should be fitted between the wheel and its flanges. The flange nut should be tightened only sufficiently to hold the wheel firmly, as excessive tightening is apt to cause damage to the wheel.

As a wheel wears down, its surface speed decreases if the number of revolutions per minute remains unchanged. The common method of remedying this is either by the use of a cone pulley on the wheel spindle, or to have a series of machines with wheels running at the different speeds proper for each size of stub at time of changeover.

Attention should be paid to the position of the work-rest on floor stands. It should be adjusted close to the wheel at all times, with a space of not over 1/8-in. between the two, thus preventing the work from slipping between the wheel and the rest. Work-rests should not be adjusted while the wheel is in motion, and after each adjustment they should be rigidly clamped.

When a new wheel is started the operator should stand at one side until it has reached its full speed and has run at that speed for at least a minute. Work should never be forced against a cold wheel, but should be applied gradually, giving the wheel an opportunity to warm up evenly. In continuous operations care should be taken that the heat generated does not become sufficiently high to cause breakage.

On dry grinding work, the grinding wheel operator should wear strong, easy-fitting goggles at all times. The grinding wheel itself should be safeguarded by one of the four approved types of protective devices, namely, hoods, flanges, chucks or bands. A hood is preferred if it can be adapted to the work being ground.

Exhaust System

In line with making the grinding operations safer, dust exhaust systems are being made more effective. Steel chips and particles from the wheel which fall to the floor or are retained in a trap are not considered harmful to the operators. Particles ten microns in size and smaller are sufficiently light to stay suspended in the air for a short time, and appreciable quantities of this light dust are considered harmful. A micron is 0.000039 of an inch, and the particles can be seen and counted only by the use of a high-power microscope.

To exhaust the light, harmful dust it is necessary to create a draft away from the operator in such a manner that the dust cannot reach the operator's head. The amount of suction required to effectively exhaust the dust depends largely on where the air intake is placed. On some operations it has been found advisable to use respirators to protect the men against dust. Respirators will give some protection, but whenever it is possible to exhaust the dust and clean the air the working conditions are improved and the dust hazard greatly reduced.

Floor stands usually have the wheel guard arranged so that an opening in the back can be attached to a central exhaust system. To prevent clogging of the pipes, a trap is provided to catch the heavy dust as near the machine as possible.

When grinding magnesium dry, it has been found advisable to carry off the dust with a spray of water in the wheel guard. The water carries the dust to settling tanks where it can be removed as a sludge. It is also advisable when grinding this metal to use treated wheels or a grease stick on the wheel face to prevent loading. In time, the exhaust pipes become coated with grease which should be cleaned out at frequent intervals to prevent "flash fires" caused by spark ignition of the magnesium dust. Steel or malleable castings should not be ground on wheels used for magnesium.

Portable grinders may be used in an enclosure connected to the exhaust system, or the castings may be placed on a bench with a grate. An enclosure or grate underneath the bench collects the heavy chips, and a connection to the exhaust system carries off the light dust.

It is more difficult to design a good dust exhaust system for swing-frame grinders used in the foundries. The best arrangement probably is with the machine in an enclosure or space from which the dust is thoroughly exhausted. Another less effective method is to use a wide-mouthed dust intake attached to the machine and carried by means of a flexible tube to the dust exhaust system. Still another method, which seems to have some merit, is the placing of a large shallow tray filled with water behind the swing-frame machine to catch the sparks and some of the dust.

Dreher Named Executive Director For Foundry Educational Foundation

G. K. Dreher

A.F.A. National Director George K. Dreher has accepted the position of Executive Director, Foundry Educational Foundation with temporary headquarters 1010 Public Square Building, Cleveland 13. Keenly interested in foundry education and youth encouragement, Mr. Dreher has served on a number of A.F.A. committees in conjunction with the Educational Division. Prior to that, and while serving as president, A.F.A. Wisconsin chapter, he took active part in the lecture courses presented by the chapter to students at University of Wisconsin, Madison. One of his most recent writings was published in American Foundryman (see November, 1946, p. 73) concerning engineering training.

"Is there a Future in the Foundry industry, Dad?"
"Yes, Son, Foundries need young men to train for key positions."
Send for this free booklet

"What are wages like in the Foundry industry, Dad?"
"Son the Foundry is one of the best paying industries in the country today."
Send for this free booklet

RECOGNIZE OLD TIMERS AT ERIE

MORE THAN eight hundred foundrymen attended the "Grand Slam" night held April 21 for the foundry industry of northwestern Pennsylvania by the A.F.A. Northwestern Pennsylvania chapter at the Masonic Temple, Erie, Pa. At that time the chapter paid tribute to more than 500 men from its area who have been active in the foundry industry for thirty or more years. In addition national officers of the Association and management executives of the castings industry were honored on this occasion.

As a build up to the gala affair the Northwestern Pennsylvania chapter, in cooperation with 46 foundries within the area, sponsored a series of newspaper advertisements (which are shown on this page) that told the general public of its activities. The theme of the advertising campaign was "Your Future in the Foundry."

In addition to the advertising campaign and publicity, the chapter prepared a booklet entitled "Your Future in the Foundry." This booklet deals with the foundry industry in Northwestern Pennsylvania specifically. In the form of a dialogue by a foundry old timer and his son, interesting facts relative to the foundry industry are given to the reader. This booklet was distributed at the banquet and also distributed to member foundries. Additional copies were given to the schools, boys clubs, YMCA's, and other organizations where they would be available to young men for reading and studying purposes.

As for the Old Timers, awards were presented to eight outstanding veterans with service ranging from 51 to 62 years. Recipients of the awards and their years of service were: Joseph Stablein, Jarecki Mfg. Co., 62 years; Martin Bach, Erie City Iron Works, 57 years; William

Employee groups and personalities present at "Grand Slam" night. 1—Chicago Pneumatic Tool Co., Franklin, Pa., headed by Chapter Director Tom Beaulac standing in background. 2—Chapter Treasurer Douglas James, Cooper-Bessemer Co., Grove City, Pa., stands in rear of company group. 3—Meadville Malleable Iron Co., Meadville, Pa., sent this crowd. 4—Left to right Elmer Evans, presiding judge, Erie County Court, Erie; Gale Ross, Mayor of Erie; and Chapter Vice-Chairman John Clarke, General Electric Co., Erie. 5—Dana A. Jones, secretary, Erie Manufacturers Association, Erie (left); and K. H. Crisswell, Director of Veterans Bureau.

"Grand Slam" night luminaries included (seated, left to right) John H. Van Deventer, Chairman of Committee for Economic Research, New York; Paul H. Vincent, Erie Malleable Iron Co.; J. A. Shuffstall, National Erie Corp. (Standing) A.F.A. National Director Lee Wilson, Reading, Pa.; A.F.A. National Director Ralph Rycroft, Kencroft Malleable Co., Inc., Buffalo; Chapter Chairman Earl M. Strick, Erie Malleable Iron Co.; and A.F.A. Secretary-Treasurer W. W. Maloney, National Headquarters, Chicago.

Barber, Erie Forge Co., 55 years; Fred Wolcott, Griswold Mfg. Co., 54 years; Emil Weber, Cascade Foundry Co., 54 years; Mike Furey, National Erie Corp., 52 years; Ernst Winefeld, Cascade Foundry Co., 52 years; and George Nuber, Superior Bronze Co., 51 years.

Guest speaker of the evening was John H. Van Deventer, director of information, Committee for Economic Development. "We can avoid another disastrous depression by stabilizing our mass production methods. We can let our mass production machines run away with us if they are not controlled. It is the greatest American machine of production that ever was produced, and we must know how to hold it in check," he told the foundrymen.

Pressure of Depression

"If we should have another major depression, pressures would be created which would be almost irresistible. These pressures lead to things along lines foreign to our way of life. It is up to us to avoid that kind of thinking," he continued.

"We have built a modern machine age in the last 50 years and made more material progress in that time than we did in the whole course of recorded history—and we are just beginning."

P. H. Vincent, general manager, Erie Malleable Iron Co., Erie, in his role of toastmaster welcomed the veterans and declared that the keynote of the meeting might be "the foundry is a good place to work."

Among the national officers who were present at this meeting were A.F.A. National Director Ralph Rycroft, Kencroft Malleable Co., Inc., Buffalo, N.Y., and Past President Lee Wilson, Reading, Pa., as well as A.F.A. Secretary-Treasurer W. W. Maloney, Chicago. Mr. Rycroft praised the efforts of the veterans and also their contributions to the castings industry.

Mr. Wilson expressed the great need for more young men in the foundry industry and stressed the need to educate castings buyers.

Mr. Maloney explained how A.F.A. is cooperating with colleges and universities to improve engineering courses for students who are to enter the foundry industry.

Invited guests at the banquet also included the mayor, local congressman, presiding judge, heads of city, county, public, trade and parochial schools, state employment and Veterans' Administration representatives, officers of the Chamber of Commerce and Manufacturers' Association, AFL and CIO union council heads and newspaper representatives.

The entire campaign was organized by the Northwestern Pennsylvania Chapter directors headed by Chapter Chairman Earl Strick, Erie Malleable Iron Co., Erie, and was supported by all of the area's 46 foundries. Joseph A. Shuffstall, National-Erie Corp., Erie, was chairman of arrangements for "Grand Slam" night.

Eight of the oldest "Old Timers" honored by the Northwestern Pennsylvania chapter at its "Grand Slam" party. Standing (left to right) Martin Bach, Erie City Iron Works, 57 years; Charles Jarecki, Jarecki Mfg. Co., 60 years; William Barber, Erie Forge Co., 55 years; Ernst Winefeld, Cascade Foundry Co., 52 years. Seated (left to right) Joseph Stablein, Jarecki Mfg. Co., 62 years; George Nuber, Superior Bronze Co., 51 years; Mike Furey, National Erie Corp., 52 years; and Emil Weber, Cascade Foundry Co., 54 years.

The following list of A.F.A. company members took part in the project:

American Sterlizer Co., Bucyrus-Erie Co., Erie Bronze Co., Erie City Iron Co., Erie Forge Co., Erie Malleable Iron Co., Griswold Mfg. Co., General Electric Co., Hay Mfg. Co., Jarecki Mfg. Co., Keystone Brass Works, National-Erie Corp., The Standard Stoker Co., Inc., Skinner Engine Co., Tanner Mfg. Co., Urick Foundry Co., and Weil-McLain Co., all of Erie, Pa.

Ajax Iron Works, Corry; Chicago Pneumatic Tool Co., Franklin; Cooper Bessemer Corp., Grove City; Meadville Malleable Iron Co., Meadville; National Malleable & Steel Castings Co., Sharon, and Oil Well Supply Co., Oil City were also participants.

FEMA Publication

OBJECTIVES, organization and activities of the Foundry Equipment Manufacturers Association, Cleveland, are described in a booklet "Our 29th Year," published by the trade group. 1947 officers, directors and committees; past presidents and secretaries, and member companies are listed. Also included are the constitution and by-laws of the association and the address of Thomas Kaveny, Jr., Herman Pneumatic Machine Co., Pittsburgh, immediate past president, at the 1946 annual meeting.

PRACTICAL VOCATIONAL GUIDANCE

O. E. Lawson
Foundry Instructor
W. D. Lowe Vocational School
Windsor, Ontario

IT IS DIFFICULT TO DETERMINE just when, and where, foundry practice had its origin. It is evident that crude methods of molding were in existence long before the dawn of written history. When Solomon built his temple and placed two ornate brass pillars before the entrance, the skill required for molding and castings had reached the proportions of a fine art.

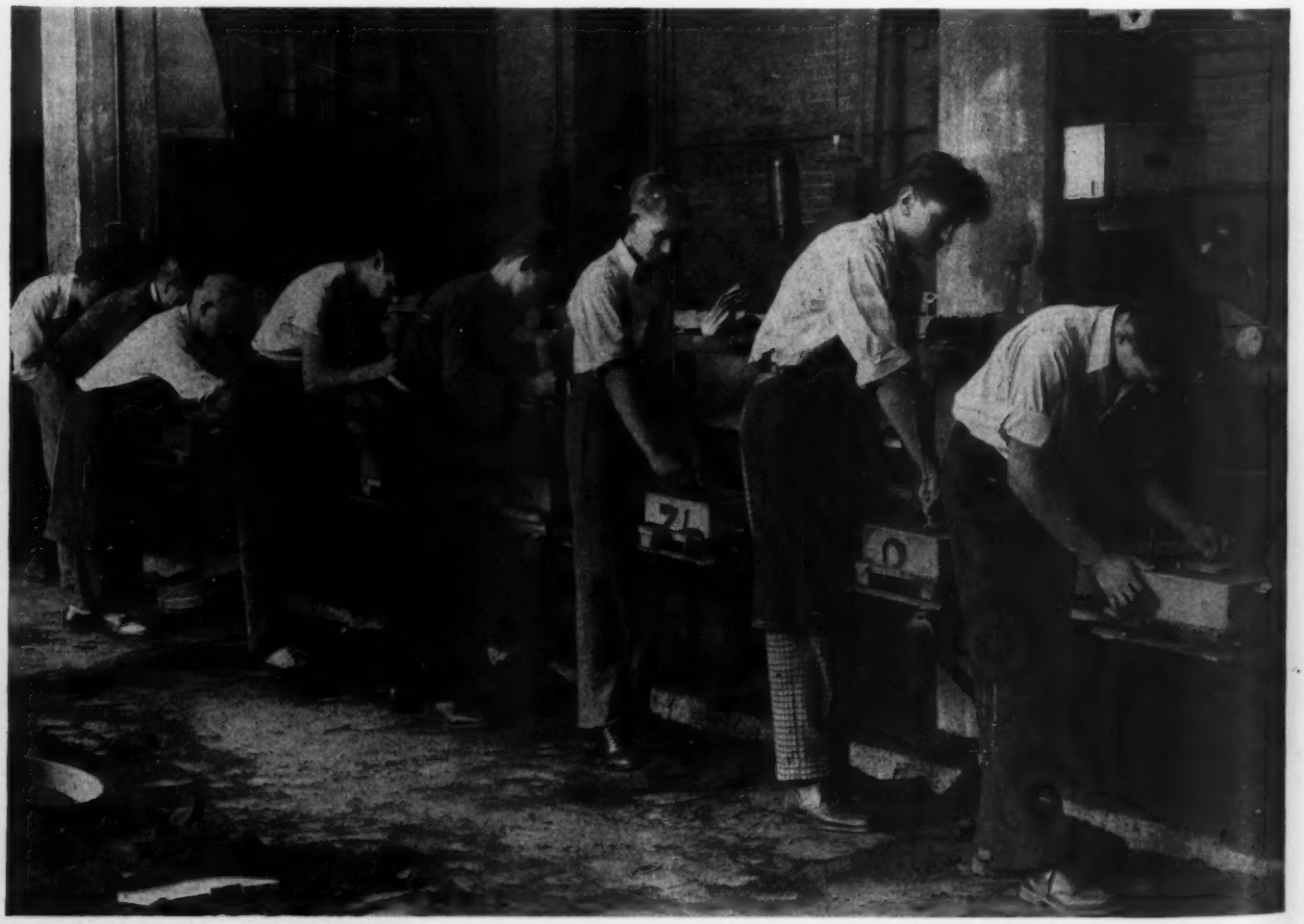
Molding then, is an ancient and honorable trade. The skills and principles have been handed down from generation to generation from the earliest times. But even today a molder, being asked to make those two brass pillars, would think it no mean task; the art of forming sand into the shape of those pillars would require the same principles and skills as were used in the time of Solomon. Those who are engaged in producing castings can feel that their roots go back to that unknown period of history when man first decided to make a mold and pour metal into it. That act created a basic industry.

In this modern age, the foundry is recognized as a basic industry. Our material civilization is only possible because there are metals available from the foundry. Our steam engines, steam boats, aeroplanes, automobiles, sky scrapers and modern machines are all more or less the product of the foundry. The metals used to fabricate these structures either came from the foundry in the form of castings or in the form of ingots. Castings have been produced weighing from ½ oz to 250 tons.

Production of the great variety of castings from commercial metals to meet exacting specifications has converted foundry practice from what used to be an industrial art into an exact science. This new demand for castings to meet specific needs has made the foundry a gigantic chemical and physical laboratory. Modern melting furances can be likened to the retorts of the chemist magnified many times. What goes on in these furnaces is as much a problem in chemistry as in the process in the retort in a small chemical laboratory.

The foundry provides an excellent example of the industrial application of the sciences of physics and chemistry. Foundries today that still operate by rule-of-thumb have little chance of success against their

A group of foundry students (below) engaged in bench molding, and (right) examples of aluminum, bronze and gray iron castings produced in the school foundry.



Vocational schools and the foundries they serve benefit to the fullest extent when mutual understanding and cooperation are the greatest. Relating vocational school facilities and foundry vocational training to the local castings industry is a worthwhile educational project which might well be undertaken by every chapter educational committee.

more scientific competitors. The need for skilled men in the art of molding and skilled men in the application of scientific principles in making castings is an urgent need in the foundry today. To meet this need, the United States and Canada have included foundry courses in many of their vocational schools.

In the W. D. Lowe Vocational School of Windsor, the foundry department has been operating for the past 24 years. During that time, approximately 4000 to 5000 students have taken an elementary foundry course. The need for such a course is evident when one investigates the importance of the foundry industry in this city.

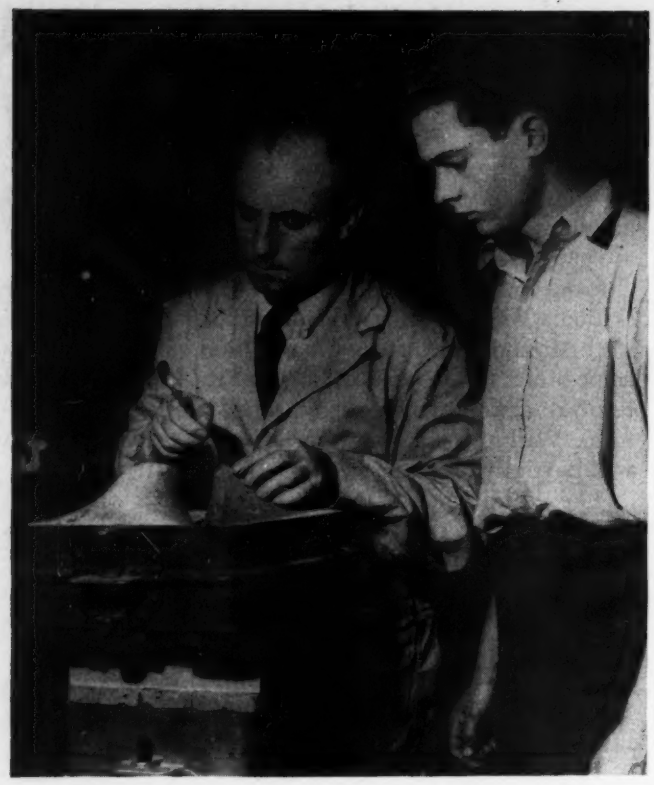
Windsor, being the automotive center for Canada, uses a great number of castings of every commercial metal. All castings such as cylinder blocks and heads, brake drums, water jackets, crankshafts and crank cases, bushings and bearings, etc., are made in the local foundries. The variety of castings needed has led to the establishment of every type of foundry in the city.

A large automobile company's steel and cast iron foundry, which is one of the most modern in Canada, has developed to a high degree the centrifugal method of pouring moulds. With this method of pouring steel castings, they have established an enviable reputation not only in Canada but throughout the United States. With its 16 four-ton electric furnaces, the foundry has a capacity of 250 tons every 8 hours. Independent foundries supply the automobile plants, farm machinery companies and others with gray iron, malleable iron and non-ferrous castings. In all, well over 2000 men are employed in the foundries.

From this industry, there is a continuous demand for skilled workers. To assist students who are interested in the foundry and to give them as wide an experience as possible, the vocational school foundry is equipped to make castings in gray iron, brass, bronze and aluminum. With this training, it is hoped that these students will partially meet the needs of the industry.

The equipment in the foundry consists of a 6-ton cupola and two reverberatory type fuel oil non-ferrous furnaces. A pedestal grinder and sand blasting machine takes care of snagging and cleaning castings, and an electric core oven is used for baking cores. There is enough floor space for 20 students working individually, and a separate floor is used for making cores. With this equipment it is possible to give foundry students a fairly wide experience in foundry methods.

The foundry course given in schools is not meant to produce finished craftsmen. Under the Vocational Training Act, the first purpose is purely educational. To allow students to spend brief courses in the various shops to give them some idea of the skills, principles



The author instructing a student in patching a mold.

and methods involved in each, is the chief function of the vocational school. Consequently, all 9th grade students are given an opportunity to spend part of their first year is an many shops as possible.

At the end of the first year, the students are asked to select the trade in which they would like to specialize. Thus according to their interest and ability they may elect to specialize in drafting, patternmaking, foundry practice, machine shop or any other trade that the school may offer. When a student specializes in a trade, he is given a more intensive course in that trade and spends more time in the particular shops concerned.

Since most trades are more or less inter-related, it follows that certain trades should know something about their related trades. Hence, students who specialize in drafting, patternmaking, chemistry and machine shop should continue their studies in the foundry.

During their course in foundry practice, pupils begin to make molds of simple shapes, progressing gradually to more intricate things. The first ten molds are made from flat-back patterns. After this a solid ball is given as a pattern, and the students learn to cut an irregular parting line. The next job is a split-sphere pattern, and this demonstrates to the student the advantage of using a split pattern instead of a solid pattern. Additional split patterns follow until the points to be learned from a split pattern mold are absorbed.

Then a simple irregularly shaped pattern is given the students, and they learn to make it sit level by tucking sand under it. They note, in this type of mold, the projection of sand hanging from the cope, and learn how to support it with nails, soldiers or gaggers. Then an intricate irregular pattern is given where the students make the pattern sit level by use of a dummy followboard. It is only a step from that to the use of a regular followboard. By this method of teaching, the students absorb, step by step, the principles and methods.

At this point they branch off into learning about cores and their manufacture. The method used in teaching the students to make cores is somewhat similar to the methods used in making molds, namely, beginning with something simple and working up to something more difficult. After their period in the coreroom they go back to making molds requiring cores, and make enough of these to familiarize themselves with the procedure for placing cores in molds.

Metal and Alloy Instruction

During their period of learning to make molds, a series of lessons is given on metallurgy, beginning with characteristics of pure metals and working gradually into alloys of various kinds. The physical and chemical properties of metals are then taught and the students are given instructions on how to mix metals to produce desired results. This continues throughout their course and is designed to give the students an elementary knowledge of the common commerical metals such as iron, copper, lead, tin, zinc, aluminum and magnesium.

Later some lessons are given on the operation and charging of furnaces, after which the students put their knowledge to practical use by operating the school furnaces. Losses of metal are taken up with the students, with the a view to teaching them how to cut losses from oxidation and volatilization to a minimum.

This outline is brief but perhaps will show to some extent what is taught in a school foundry. While it is impossible for most people to gain an intimate knowledge of foundry practice, it would be desirable for those who are involved either directly or indirectly with the buying and selling of castings, or in any way connected with products of the foundry, to have an elementary knowledge of foundry procedure.

Foundry Products Versatile

In foundry circles, there seems to be much discussion recently of the need for engineers to know more about the foundry and its products, and for foundrymen to make better known to designers the expanding possibilities of castings. This truth was demonstrated some years ago by an automobile company when it astonished the engineering world by using a cast crankshaft for the automobile, completely eliminating the necessity of forging. Previous to that, such a use of a casting had been thought impractical. This demonstration of the possible strength of castings led to the use of a single casting for tank tops during the war. This eliminated the use of welded or riveted joints, thus adding greatly to the safety of the occupants. However, during the war, engineering techniques took a gigantic leap forward; the foundries demonstrated the versatility of their products and many new applications of castings have been developed.

It is this new phase of development that concerns school foundries of the future. Here is the place to give both prospective foundrymen and engineers the basic training in practice and theory that is so essential for intelligent co-operation one with the other.

STORK DELIVERS ADDITIONS IN MICHIGAN AND CANADA

THE EVENING of March 21 was the occasion for the birth of the 37th chapter of the American Foundrymen's Association at Vancouver, British Columbia, Canada.

The newest edition to the Association family will be known as the British Columbia chapter and will draw from the estimated 70 foundry interests in the immediate vicinity. The organization meeting started from a cumulation of conferences between interested members of the Association and A.F.A. secretary-treasurer W. W. Maloney.

Sign Petition

Foundrymen in this area were interested in forming a chapter in 1945 when actual negotiations were inaugurated. An organizational group meeting was held at the Pacific Athletic Club, Vancouver on January 20, 1947 and arrangements for a petitioning meeting were made for March 21.

Norman Terry, Canadian Sumner Iron Works, Ltd., Vancouver, presiding as chairman at the March meeting, introduced the members of the Steering Committee. The committee was composed of Norman Terry, Chairman; L. P. Young, A-1 Steel & Iron Foundry, Ltd., Vancouver, Secretary; W. M. Armstrong, University of British Columbia; T. Cowden, W. M. McPhail & Sons (Canada) Ltd.; J. A. Dixon, Dixon Foundry Co.; J. F. Ross, Ross & Howard Iron Works Co., Ltd.; H. Turney, Westland Iron and Steel Foundries, Ltd.

Following the completion of signing the petition, which was sent to the A.F.A. National Board of Directors for approval, the group agreed upon the chapter being called the British Columbia chapter of the American Foundrymen's Association and elected the following as officers and directors of the chapter: Norman Terry, *Chairman;* T. Cowden, *Vice-Chairman;* L. P. Young, *Secretary-Treasurer; Directors:* H. A. Sturrock, Associated Foundries, Ltd.; J. S. Graham, Mainland Foundry Ltd.; J. A. Dixon; Fred Bay, Vivian Engineering Works, Ltd.; F. E. Done, Reliance Foundry Co., Ltd.; J. M. Hughes, Vancouver Engineering Works, Ltd.; H. J. Turner; and W. M. Armstrong.

Installation ceremonies and the presentation of the "family" cast iron baby rattle to Chairman Terry in behalf of the Association will probably be done at the first chapter meeting this fall.

CENTRAL MICHIGAN

Chapter status for the Central Michigan chapter, No. 38, was granted also by the A.F.A. National Board of Directors, thereby making it the fourth A.F.A. chapter in the State of Michigan.

Early in 1946 a movement was begun to form a chapter of A.F.A. in this area with headquarters in Marshall, Mich. A preliminary meeting was held on January 30 of this year and a second meeting was held on March 24 which was attended by secretary-treasurer W. W. Maloney, Chicago.

Petition Drawn Up

The petition for a Central Michigan chapter of American Foundrymen's Association was drawn up and signed at a meeting held April 8 at the Shuler House, Marshall, Mich. Douglas J. Strong, Foundries Materials Company, Coldwater, Mich., presided and Charles Schureman, Baroid Sales Div., National Lead Co., gave a talk on synthetic molding sand problems.

Officers and directors of the Steering Committee will continue to serve until the chapter is officially installed in the fall. The Steering Committee to whom all credit must go for creation of the Central Michigan chapter consists of the following: Chairman, D. J. Strong; Vice-Chairman, John Secor, Hill & Griffith Co., Niles; and Secretary-Treasurer, Fitz Coghlin, Jr., Albion Malleable Iron Co., Albion.

Committee members include Kenneth Burlow, Marshall Furnace Co.; Erwin Doerschler, U. S. Foundry Corp., Kalamazoo; O. J. Drenum, Battle Creek Breadwrapping Machine Co., Battle Creek; W. E. Fisher, Reed Foundry & Machine Co., Kalamazoo; J. R. Granger, Calhoun Foundry Co., Homer; H. J. McCoy, Albion Malleable Iron Co.; E. H. Schlepp and L. H. Stryker, Riverside Foundry & Galvanizing Co., Kalamazoo.

Serve Now

Service on all A.F.A. committees benefits the industry and reflects honor upon those who give unselfishly of their knowledge. Committees for the 1947-48 season are now being formulated—send your name and qualifications to National Headquarters if you are willing to participate in Association committee work.

Change Milan Fair Date

THE MILAN INTERNATIONAL FAIR, originally scheduled for September, will be held June 14-29, J. B. Erskine, S. LaSalle St., Chicago, U.S.A. representative of the sponsors, has announced. Complete details on costs, licenses, etc., are available.

One goal of laboratory sand testing is to obtain maximum control over the composition and properties of sand mixtures by means of standard methods. Equally important, however, is the attainment through laboratory testing of control over actual mold quality. By means of testing techniques based on standard procedures, but modified to take into account variables frequently encountered in production practice, a method is described for accumulating data useful in defining the range of values over which mold properties may extend.

MOLDING SANDS

PHYSICAL PROPERTIES

G. R. Gardner
Aluminum Research Laboratories
Aluminum Company of America
Cleveland

IT IS NOW COMMON FOUNDRY PRACTICE to determine the properties of green molding sands by testing under the controlled conditions defined in the standards and tentative standards adopted by the American Foundrymen's Association.[1] These tests are of great benefit in achieving control over sand mixtures, and by virtue of their nearly universal recognition permit ready exchange and understanding of test data among foundry personnel.

It is apparent, however, that production foundry practices introduce certain variables not accounted for in laboratory testing techniques. Although a high degree of control may be maintained over sand compositions by standard testing at the time of mixing, it does not necessarily follow that this control is automatically extended to include the quality of molds and castings. The author believes that in addition to making standard tests for the purpose of controlling sand mixtures, it is also desirable and beneficial to understand thoroughly the extent to which operating variables are capable of affecting mold properties.

For example, laboratory testing might indicate the moisture content of a green molding sand to be optimum, and physical properties to be satisfactory in specimens rammed with three blows of the rammer according to the standard method. Assuming the test sample was taken from a freshly prepared mix, many factors may cause the moisture content of the sand to change by the time it is finally rammed into a mold. Furthermore, variations of the degree of ramming in production practice may be of considerable magnitude, with the result that finished molds are likely to have properties different from laboratory test specimens.

[1] *Foundry Sand Testing Handbook*, published by American Foundrymen's Association, Chicago, fifth edition (1944).

It is the purpose of this paper to demonstrate the extent to which several mold properties can vary when sand moisture content is not a constant, and when the ramming energy is other than the rigidly controlled value used in making standard tests. The fact that such variations occur is, of course, well known. An attempt is made herein to define the variations in a quantitative manner and to demonstrate useful correlations based on the data.

Materials and Specimens

Two typical synthetic molding sands of the following composition were selected for the tests:

MIX A
Bank sand, A.F.A. Fineness No. 150, clay content, 0.9 per cent
Western bentonite, 4.50 per cent
Cereal flour, 0.50 per cent

MIX B
Washed silica sand, A.F.A. Fineness No. 70
Western bentonite, 4.00 per cent

Using these basic formulas, six mixes of each composition were prepared which differed only in their water content. The moisture was varied in steps over the entire workable range for each basic mix. Control over uniformity of the mixes was obtained by carefully weighing all ingredients from standardized stocks, by establishing the mixing time at one minute dry and 15 minutes wet in a covered muller, by aerating each mix through a six mesh screen, and by storing the mixed sand in sealed containers which were opened only to remove sand as each test specimen was produced. Frequent checks were made to insure that no change in moisture content occurred while any series of tests was in progress.

Method of Study

In addition to standard specimens made by ramming with three blows of the rammer, specimens were also made with one, two, four and five blows. The test specimens of each basic mix, therefore, varied in moisture content within the workable limits and also varied

in hardness corresponding to a range which would be classified from "soft-rammed" to "hard-rammed."

The following properties were determined for each possible combination of moisture content and degree of ramming:

Permeability, A.F.A. standard method
Compressive strength, A.F.A. standard method
Deformation, experimental method
Tensile strength, A.F.A. standard method
Surface hardness, A.F.A. standard method
Apparent density, experimental method

All specimens were tested immediately after forming and the tests were made in triplicate. Average values only are used in presenting the data. In considering each physical property determined in these tests it was necessary to deal with three variables; the data, therefore, has been assembled in the form of plan views of three-dimensional graphs. The magnitude of each property with variations in moisture and ramming is shown by means of contour lines which pass through points of equal elevation.

Property Test Results

The data presented in Fig. 1 to 12 inclusive define the physical properties of Mixes A and B throughout the ranges tested. Optimum moisture for best working characteristics was considered to be about 4.3 per cent for Mix A and 2.5 per cent for Mix B. In each case it will be seen that the properties vary considerably when both the moisture content and ramming energy are changed from standard values, and changes follow smooth, characteristic patterns for each property.

Permeability. Figures 1 and 2 illustrate the permeability ranges of Mixes A and B and show same general type of pattern. Both mixes provided the highest permeability at a definite moisture content for any specified degree of ramming. The permeability of Mix A decreased when moisture was raised or lowered from 4.0 per cent. The critical moisture content for Mix B was 2.0 per cent. Employing any moisture content in the range tested, the permeability of both mixes decreased as ramming was increased and the rate of decrease became less as more ramming energy was applied.

Of particular interest is the amount of change in permeability which occurred over the entire range of these tests. The results demonstrate that if moisture content and ramming were varied in production use of these sand mixes to the extent indicated, molds made with Mix A might have a permeability anywhere between 22 and 43 while the permeability of molds made with Mix B might fall between 95 and 170. Thus the effect of possible production variables should be taken into account in interpreting standard laboratory tests, which would have indicated the permeability of Mix A to be 33 and that of Mix B to be 126.

Compressive Strength. Figures 3 and 4 show the compressive strength of the test mixes with the same variations in moisture content and ramming previously described. Again it was found that the pattern of this property was similar for the two mixes. Highest compression strength with Mix A was achieved with about 3.0 per cent moisture for any specified ramming energy. This peak is not defined clearly for Mix B since it appears to fall at a moisture content below that required for safe molding qualities. Extrapolation would indicate the peak to fall between 1.0 and 1.5 per cent moisture which is outside the usable range.

Moisture and Ramming Variations

It is again of interest to note the wide range of compressive strength values which resulted from variations in moisture and ramming. Values ranging from less than 3.5 psi to over 8.0 psi were obtained, while the standard test results indicated the compressive strength of Mix A to be 5.9 psi and of Mix B to be 5.3 psi.

Deformation. The effects of variations in ramming and moisture on deformation of Mixes A and B are

Fig. 1—Permeability range chart of mixture A.

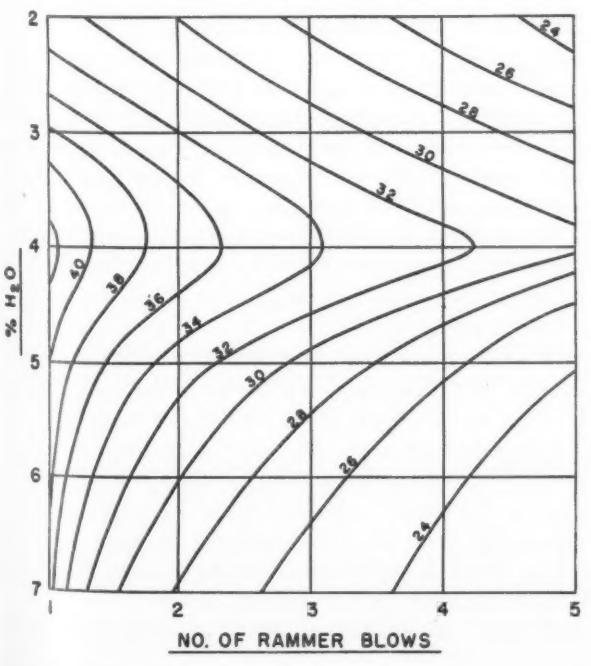
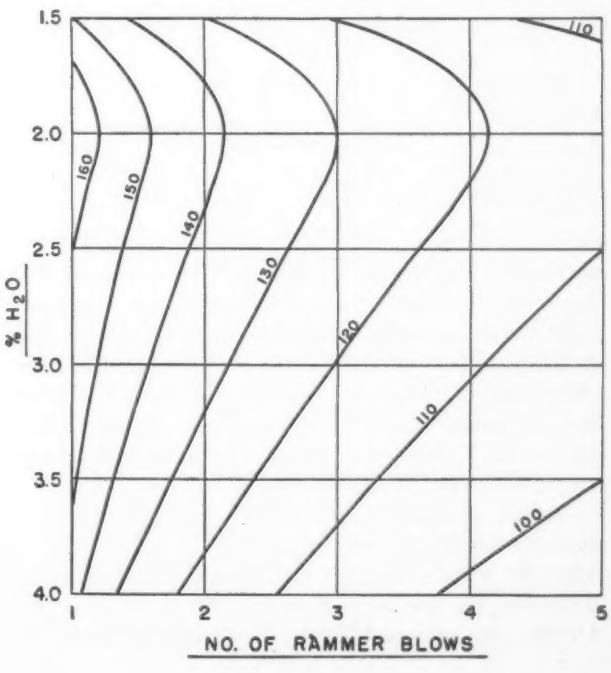


Fig. 2—Permeability range chart of mixture B.



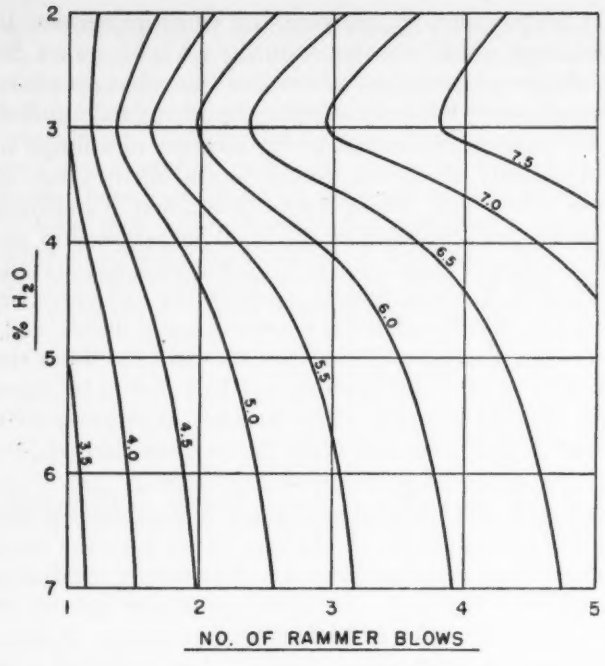


Fig. 3—Green compressive strength (psi), mixture A.

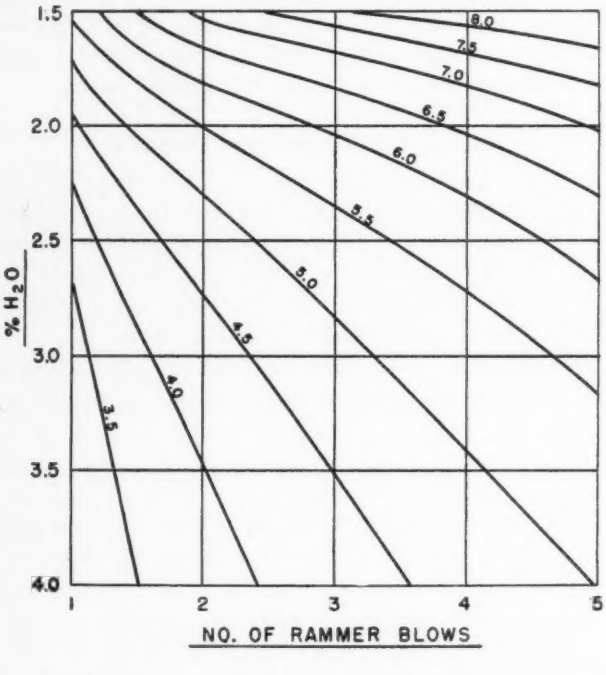


Fig. 4—Green compressive strength (psi), mixture B.

shown in Figs. 5 and 6. Changes in ramming did not appreciably affect deformation of Mix A except in the high moisture range. Deformation increased over the entire range as moisture was increased. With Mix B, ramming affected deformation to about the same extent as moisture. With both mixes, it was found that in the high moisture range hard ramming caused a slight decrease in deformation.

Values ranging from 0.006 to 0.030 in./in. were found with Mix A and from 0.006 to 0.015 in./in. with Mix B. Values for the standard test conditions were 0.016 in./in. for Mix A and 0.008 in./in. for Mix B. Unlike the permeability and strength results, the deformation property was not found to peak at a particular moisture content but, in general, increased directly as the moisture was increased.

Tensile Strength. The tensile strength test results, shown in Fig. 7 and Fig. 8, revealed an unusual pattern for both mixes in that optimum amounts of both ramming and moisture were found required to obtain the peak green tensile strength. To define this relationship in a different manner, it was found that in the low moisture ranges for both test mixes, ramming energy beyond certain amounts caused the tensile strength to decrease.

No explanation of this phenomenon is offered, but if such a condition actually exists it would have practical significance when ramming molds with sand tempered in the dry range. Again it was found that variations in moisture content and ramming resulted in tensile properties widely different from those obtained under standard test conditions. The standard tensile strength values were 7.0 oz. per sq. in. for Mix A and 13.7 oz. per sq. in. for Mix B.

Property Patterns

Surface Hardness. Determination of surface hardness of the test mixes, shown graphically in Figs. 9 and 10, reveal that the pattern for this property approximates the compressive strength pattern, the two properties being roughly proportional. Both hardness and compressive strength appear to reach peaks at the same moisture content for each test mix. Hardness values ranging from 45 to 85 were found with Mix A and from 45 to 75 with Mix B. The hardness values determined under standard test conditions were 71 and 68 respectively.

Density. As a matter of further interest, specimens of the two mixes were formed under the various conditions of moisture content and ramming and the apparent density determined. The results, shown in Figs. 11 and 12, reveal similar patterns to those obtained in the permeability tests, with the permeability inversely related to density. The density of Mix A varied between 86 and 95 lb per cu ft and that of Mix B between 91 and 98 lb per cu ft.

Non-destructive Testing. As the data were assembled and plotted, it was found that the various sand properties followed characteristic patterns when moisture content and ramming were varied. It then became apparent that the determination of one property under known moisture and ramming conditions would permit other properties to be estimated by reference to the same intercept on the other graphs. Practical advantage of this principle might be gained in non-destructive testing of molds.

The surface hardness test, which can be made conveniently at almost any location on a mold surface, results in a small indentation but does not destroy the mold or affect its serviceability. Moisture tests made of a representative sand sample taken at the time of ramming the mold, combined with the hardness value as determined at the mold surface, provide sufficient data to establish the exact ramming energy applied at the mold location under consideration.

Reference to graphs of other physical properties,

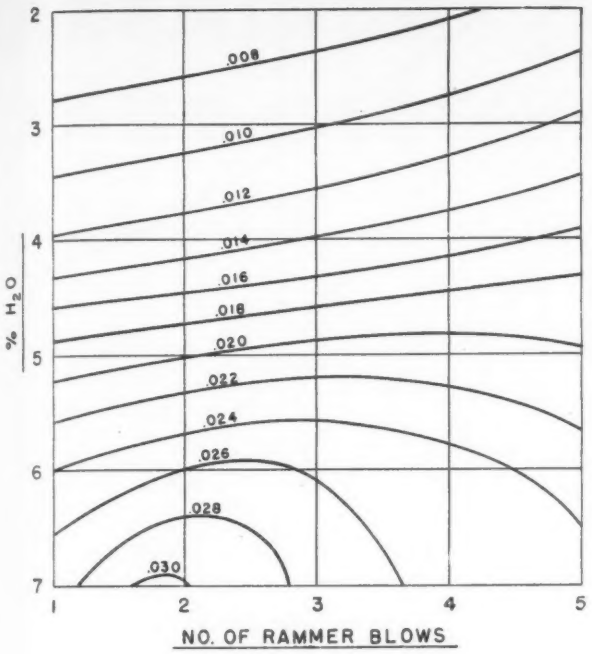


Fig. 5—Deformation range chart of mixture A (in./in.)

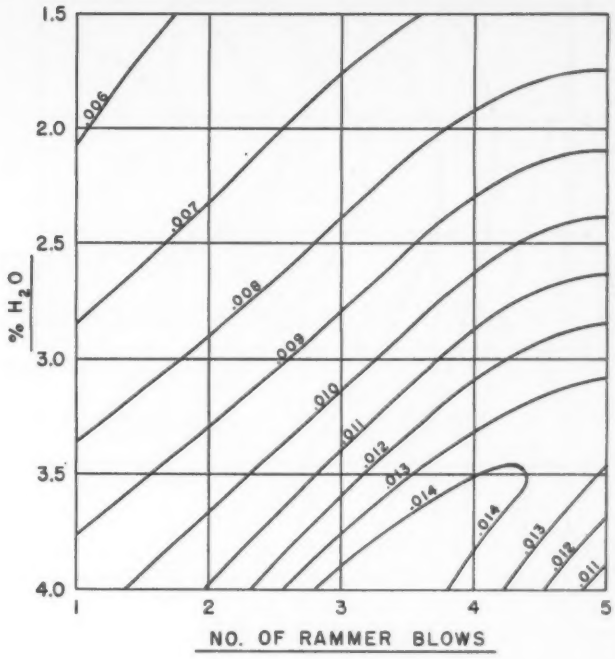


Fig. 6—Deformation range chart of mixture B (in./in.)

employing these established values of moisture and ramming, would permit estimates to be made of these other properties existing in the mold. It is, of course, necessary to maintain control over the composition and properties of the production molding sand by the usual standard tests.

Conclusions

1. It has been found that several physical properties of two basically different synthetic molding sands follow similar trends when test specimens were molded under various combinations of moisture content and ramming energy. Although the magnitude of the values was found to be quite different for those properties which were influenced by the grain size of the two test mixes, the effects of changes in moisture and ramming on these properties conformed to the same general pattern.

2. The magnitude of the changes in physical properties of the test mixes which resulted from variations in moisture content and ramming within the workable limits was found to be very great. These data emphasize the importance of knowing the extent to which moisture and ramming vary in production use of molding sands, and of understanding the effect of these variations on the properties of molds as com-

Fig. 7—Green tensile strength (oz./sq.in.), mixture A.

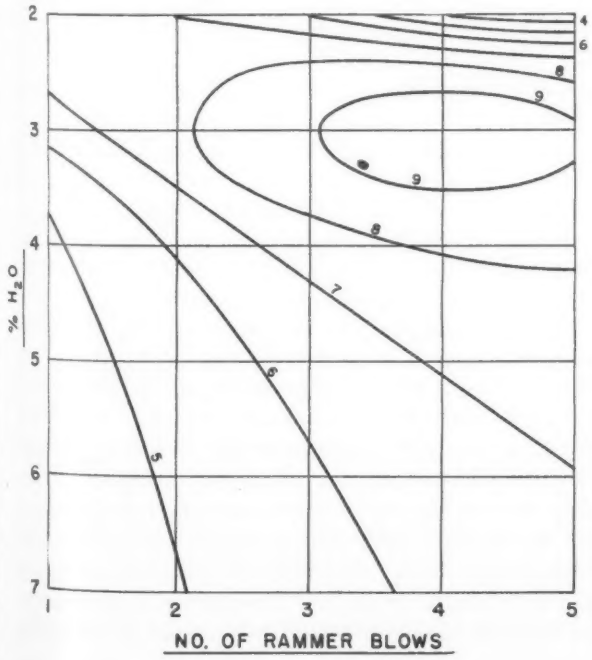
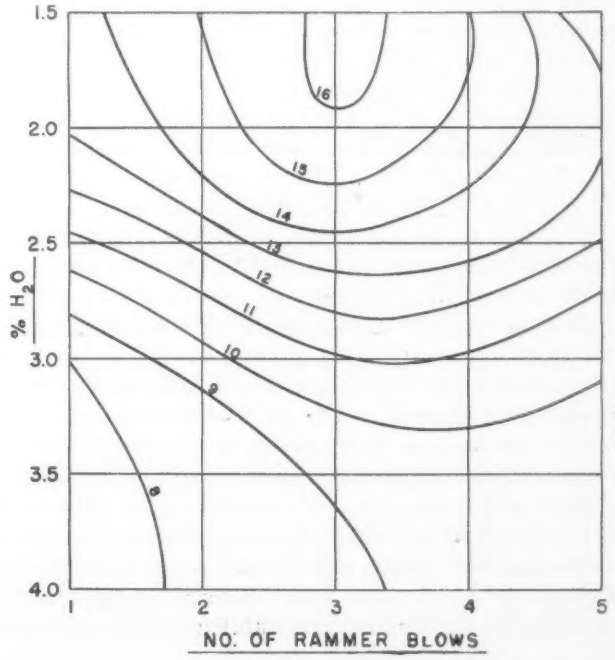


Fig. 8—Green tensile strength (oz./sq.in.) mixture B.



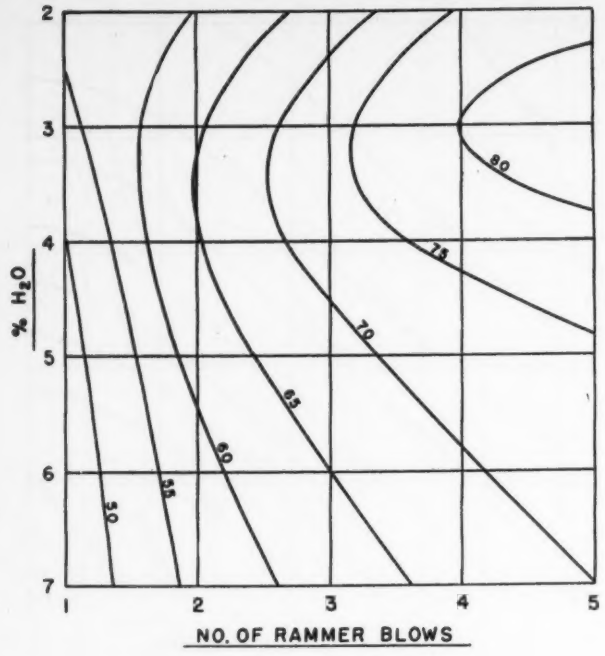


Fig. 9 — Surface hardness range chart of mixture A.

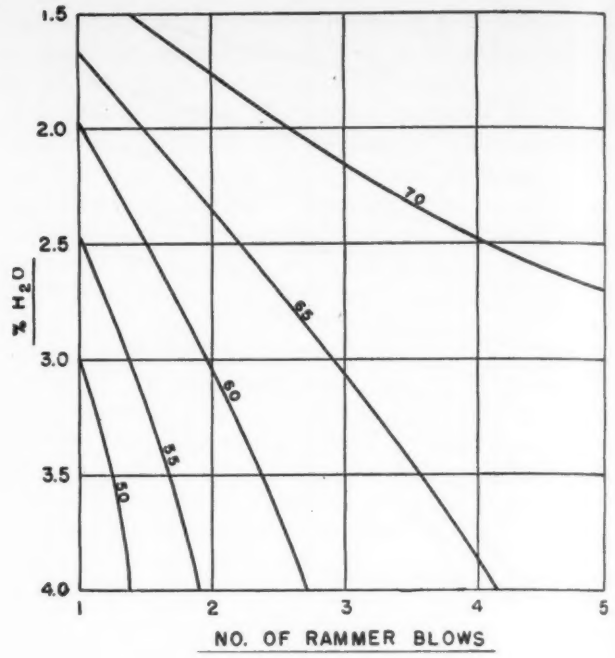


Fig. 10—Surface hardness range chart of mixture B.

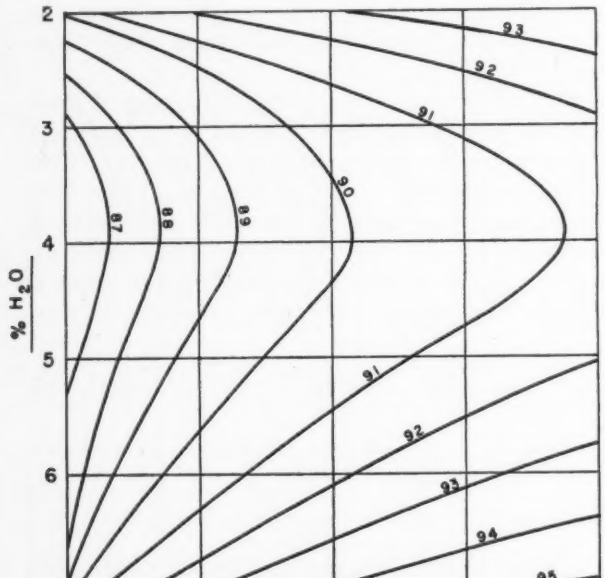


Fig. 11 — Apparent density of mixture A (lb./cu.ft.).

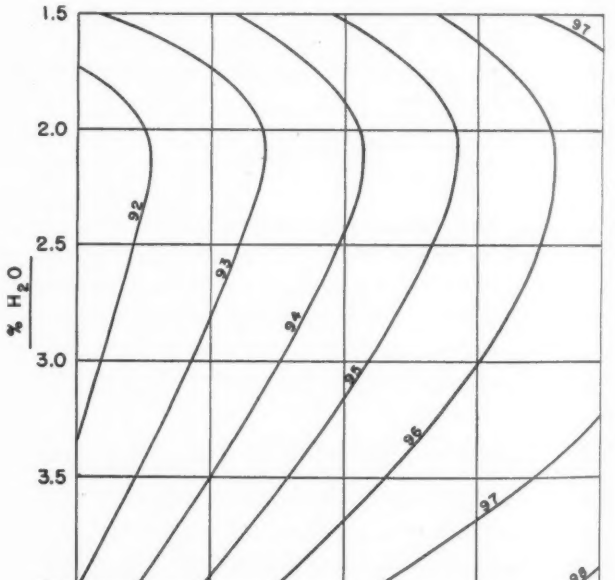


Fig. 12—Apparent density of mixture B (lb./cu.ft.).

pared with the values obtained when testing the sand under standard conditions.

3. It is believed that when a molding sand has been surveyed by the method presented, the data would then permit the non-destructive testing of any molds produced with that sand. It would be necessary to make a moisture determination of the sand just prior to making the mold, and surface hardness determinations at any desired location on the mold. The point of intersection on the hardness graph of the values so determined defines a reference point which, when applied to the graphs of the other properties, would provide an estimate of permeability, strength, or any other property previously surveyed, at the location of the mold under examination.

4. Although fairly close correlations were found to exist between certain properties, for example, compressive strength and hardness, or permeability and density, the data taken as a whole indicates that most sand properties vary independently of other properties when moisture and ramming are changed. In selecting an optimum moisture content and degree of ramming for a molding sand as applied to a particular casting, it is necessary to make compromises based on requirements of the part and knowledge of sand properties beyond that provided by standard test results.

ALUMINUM SAND CASTING ALLOYS

EFFECT OF ROOM TEMPERATURE INTERVALS BETWEEN QUENCHING AND AGING

H. A. Quadt
Metallurgist
American Smelting & Refining Co.
Barber, N.J.

IN COMMERICAL ALUMINUM HEAT TREATING practice to produce high strengths, castings are soaked at elevated temperatures (generally 940 F to 1000 F) for extended periods ranging from 4 to 20 hr depending upon the alloy and the castings being treated. This treatment brings about the solution of certain metallic constituents through the mechanism of diffusion. The castings are then quenched, usually in hot water, to retain the solid solution produced.

Since the dissolved material is much less soluble at room temperature than at elevated temperatures, an unstable condition results and most commercial alloys begin to "age." This aging is probably a precipitation of fine, dispersed particles of intermetallic compounds which under certain conditions and for certain alloys can be resolved under the microscope at a very early stage.[1,2] Continued precipitation affects many properties of the alloy, hardness and strength generally being markedly increased.

For most commercial alloys the original solution treated properties are quite transitory and large changes are apparent after only a few weeks at room temperature. To speed up the precipitation or aging process after quenching, castings are commonly reheated to temperatures of about 300 F for several hours. This "artificial aging" treatment produces in a short time approximately the properties that would require several weeks' aging at room temperature. Further, this treatment produces stable mechanical properties and no further changes occur during subsequent room temperature aging periods.

The data in Figs. 1 and 2 have been plotted on a semi-log scale to emphasize aging effects during the first few days after heat treatment.

In a successful heat treating operation, the pertinent factors discussed above are kept under close control since the effects of soaking time, temperature, and quenching rate are well known. One variable seldom subject to scrutiny is the period between the quenching operation and the artificial aging treatment. It is usually not deemed critical, being determined by practical but nonmetallurgical considerations such as furnace availability or labor shift changes.

Once a cycle has crystallized, production schedules usually require rigid adherence. In this author's experience, intervals between quenching and artificial aging varying from zero to three days have been observed. In some installations quenched castings are immediately transferred to an aging furnace while in others they are held for the night shift. With the advent of a weekend, several days often elapse before the aging treatment can be fitted into the cycle.

The effects of various room temperature intervals between quenching and artificial aging at 310 F on some mechanical properties of several commercial aluminum sand casting alloys have been determined, and it is the purpose of this paper to report the results. Wrought 4 per cent copper and duralumin type alloys have been investigated in this respect with marked effects reported.[3] More recently, specific interval recommendations were suggested for wrought 75S,[4] although it has been indicated that the effects are sufficiently minor in the light of commercial experience to warrant retraction of a rigid interval limitation.[4,5]

Experimental Procedure

Production of Tensile Specimens. The foundry practice utilized in producing sand cast tensile specimens has been described.[6] Briefly, ingots of each alloy were melted in a No. 45 clay graphite crucible in a coke fired, forced draft furnace. The heats were removed from the furnace and permitted to cool quietly to the desired pouring temperature of 1225 F. No metal fluxing procedure was utilized and no stirring or other deleterious agitation permitted. The alloys were cast into sand molds producing standard half-inch diameter tensile bars. These were used in the as cast shape, no machining or finishing of any kind being accorded the reduced tensile section.

Heat Treatment Procedures. Solution heat treatments were conducted in an air circulating electric furnace capable of being controlled to ±3 F. The castings were soaked for 16 hr and quenched in water preheated to at least 185 F. The quenched bars were then cooled to room temperature in tap water to make them available for immediate artificial aging where desired.

Artificial aging at 310 F was accomplished in electrically heated molten salt baths set to ±2 F. Generally at least two specimens were tested for each treatment.

Effect of Room Temperature Aging Intervals on Al, 7 Per Cent Si, 0.3 Per Cent Mg Alloy. Sand cast test bars were poured from each of three different heats of 7 per

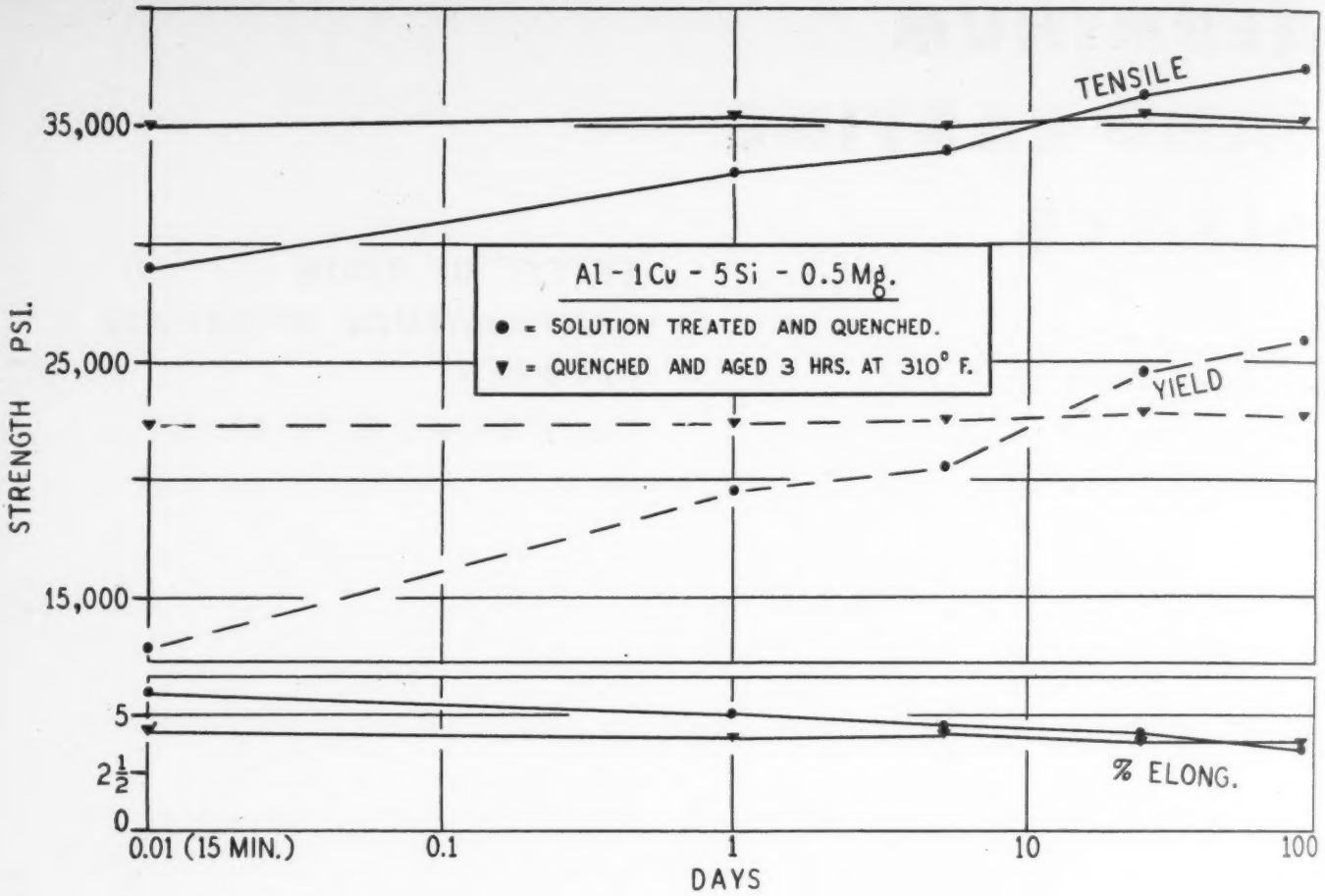


Fig. 1—Effect of room temperature aging of a heat treated aluminum alloy. Specimens treated at 310 F were first aged one day at room temperature.

cent silicon, 0.3 per cent magnesium alloy. Their analyses are given in Table I.

The tensile bars were solution treated at 1000 F and quenched. Some were aged at 310 F immediately after being cooled to room temperature. In these instances, aging was initiated within 30 minutes of quenching. Another group of bars was similarly aged at 310 F 24 hours later, and a third group was artificially aged one week later. The effects of these room temperature intervals on the properties of the alloys are shown in the plots of Fig. 3.

Effect on Al, 1 Per Cent Cu, 5 Per Cent Si, 0.5 Per Cent Mg Alloy. Sand cast bars of the alloy described in Table II were solution treated at 980 F and quenched. They were aged at 310 F with various time intervals at room temperature being utilized as before. The effects of this interval may be noted from the plot in Fig. 4.

Effect on Al, 4 Per Cent Cu, 1 Per Cent Si Alloy. Sand cast bars of two 4 per cent copper alloys were solution treated at 960 F and quenched. The complete analyses are given in Table III. These were accorded the same treatment as the alloy previously described and the effects of room temperature precipitation between quenching and artificial aging may be determined from Fig. 5.

It is apparent that the amount of aging permitted at room temperature between the quenching and artificial aging treatments is of some significance. All aluminum casting alloys are not sensitive to this aging interval, one exception noted being the 4 per cent copper, 1 per cent silicon alloy. It would seem that commercial alloys in which $CuAl_2$ is the only precipitating compound are unaffected throughout the interval range studied.

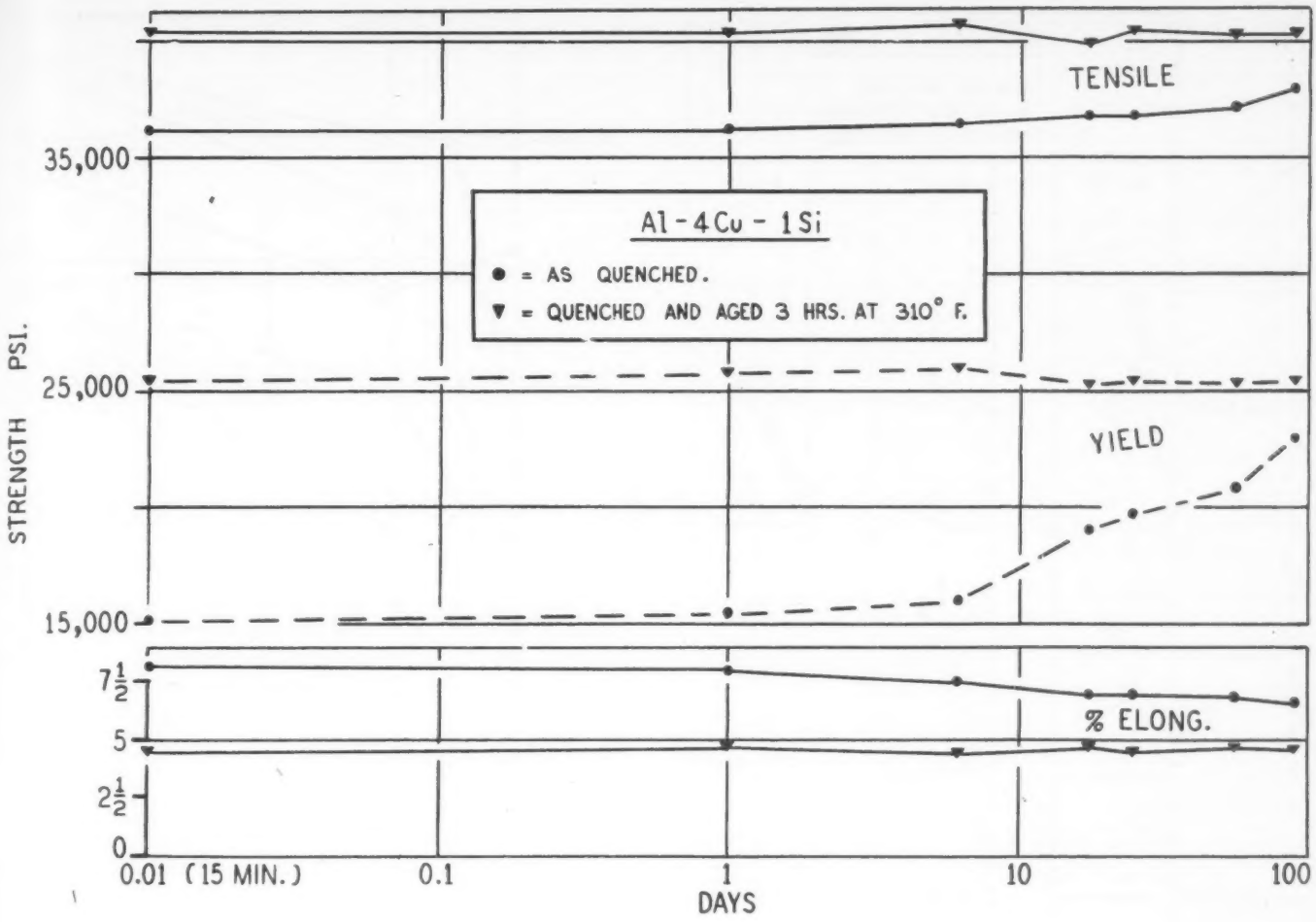
Cast alloys utilizing Mg_2Si as the principal hardening compound are markedly affected by a room tempera-

TABLE 1. ANALYSES OF AL—7 PER CENT SI, 0.3 PER CENT MG ALLOYS

Element	*Alloy A Per Cent*	*Alloy B Per Cent*	*Alloy C Per Cent*
Copper	0.15	0.02	0.09
Silicon	6.87	6.04	6.88
Magnesium	0.26	0.22	0.24
Manganese	0.02	0.01	0.01
Iron	0.29	0.13	0.24
Nickel	0.00	0.00	0.00
Zinc	0.03	0.01	0.02
Chromium	0.04	0.00	0.00
Titanium	0.11	0.11	0.03
Aluminum	Bal.	Bal.	Bal.

TABLE 2. ANALYSIS OF AL—1 PER CENT CU, 5 PER CENT, SI, 0.5 PER CENT MG ALLOY

Element	*Per Cent*
Copper	1.23
Silicon	5.21
Magnesium	0.46
Manganese	0.43
Iron	0.54
Nickel	0.02
Zinc	0.35
Chromium	0.10
Titanium	0.13
Aluminum	Bal.



ture aging interval. If they are artificially aged immediately after quenching, high strengths and hardnesses result at the expense of ductility. It is difficult to exceed the commonly specified minimums for elongation under such conditions. If, however, castings are held about one day between quenching and aging a more desirable combination of properties is obtained.

The mechanism of the observed phenomenon is not completely lucid although considerable conjecture with regard to wrought aluminum alloys has been offered. In 1929, Rosenhain[7] suggested that hardening occurring at the lower temperature was partially nullified at the elevated temperature due to coalescence of the previously precipitated particles. The increased hardening that did not proceed at the elevated temperature could be ascribed to precipitation brought on by the higher temperature and the algebraic sum of these two reactions was positive but not maximum.

TABLE 3. ANALYSES OF AL—4 PER CENT CU, 1 PER CENT SI ALLOYS

Element	*Alloy A Per Cent*	*Alloy B Per Cent*
Copper	4.34	4.10
Silicon	1.27	1.10
Magnesium	0.00	0.00
Manganese	0.23	0.02
Iron	0.51	0.45
Nickel	0.00	0.01
Zinc	0.08	0.09
Titanium	0.04	0.06
Aluminum	Bal.	Bal.

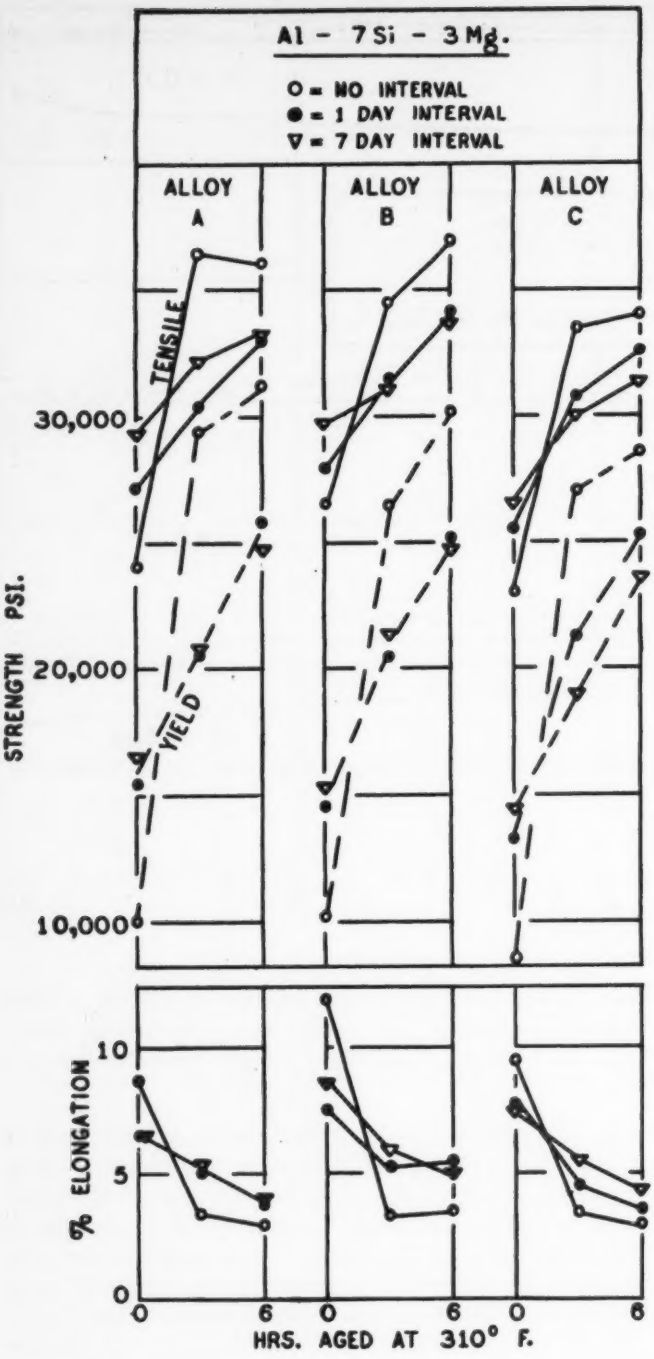
Fig. 2—Effect of room temperature aging of a heat treated aluminum alloy. Specimens treated at 310 F were first aged one day at room temperature.

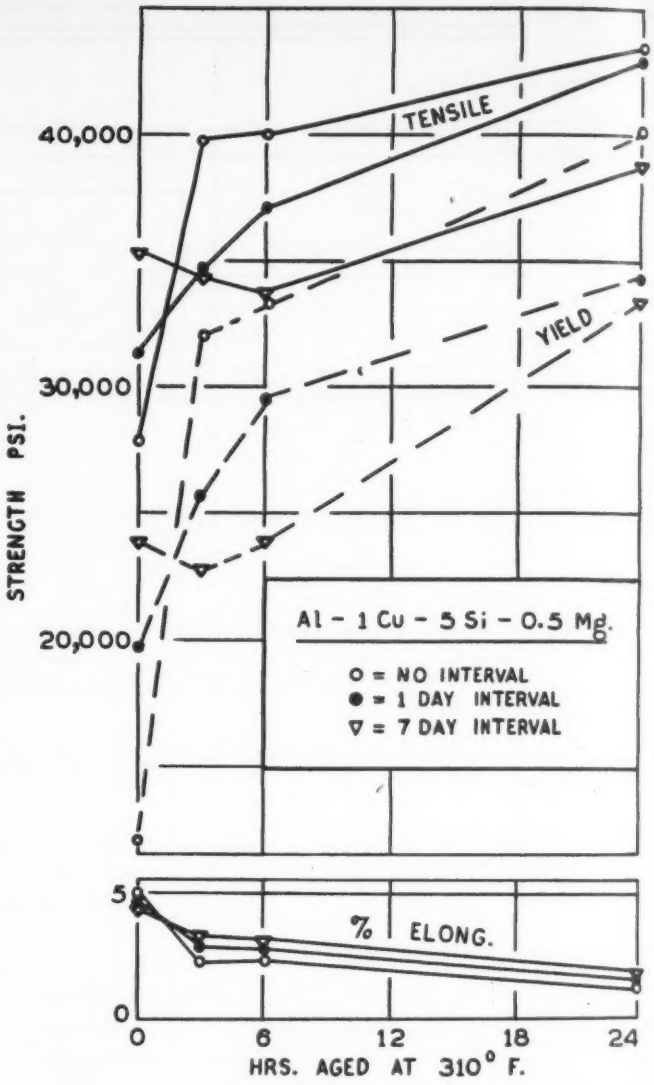
In 1932, Merica[8] elaborated upon this explanation in accordance with his promulgated "knot" theory and suggested that the "knots" formed at room temperature were not favorably suited for further development at elevated temperatures and were consumed in the process of the formation and growth of the nuclei particularly suited for development at elevated temperatures. He also visualized that the "knots" or peculiar segregations produced at low temperature had an effect on the hardening potentialities of particles formed at higher temperatures, producing lower hardness results.

In 1933, Masing[9] offered an explanation for the hardening anomalies in duralumin in which he resorted to the formation and re-solution of unstable nuclei as indicated by experiments in supercooled liquids. He suggested that the nuclei formed at room temperature (similar to Merica's "knots") were of nearly critical size and did not readily develop as a result of the reduced thermal energy available to the remaining copper atoms.

The unstable nuclei would be redissolved at elevated temperatures and a second type of stable nuclei was formed and developed in the conventional pattern. Presumably, again, the algebraic hardening effect of these concurrent dynamic processes is not a maximum.

These investigators all agree that the type of precipitation occurring at room temperature is different





Figs. 3 (left), 4 (above) and 5 (adjoining page)—Effect of room temperature interval between quenching and artificial aging of aluminum sand cast alloys.

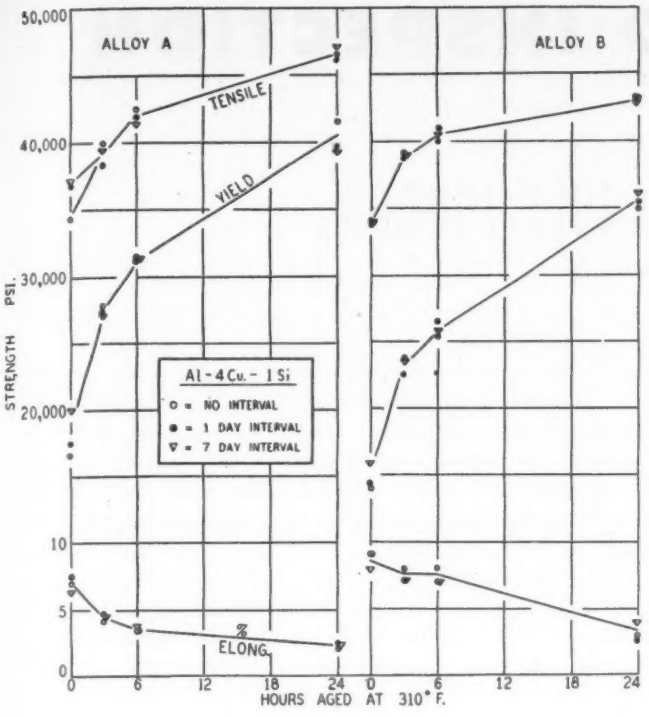
from that produced at elevated temperatures and more recent studies have concurred.[2] Internal strains developed during the quenching operation undoubtedly are contributing factors in the observed phenomena, but they have not been completely evaluated. The postulation of a working hypothesis presents intriguing possibilities but there is a compelling need for further investigation with regard to aluminum casting alloys in particular before a sufficiently complete understanding of the mechanism is realized.

In the present investigation only those alloys rapidly aging at room temperature are sensitive to a low temperature interval between quenching and subsequent aging at a higher temperature. The 4 per cent copper alloys investigated here aged relatively little over the observed 7-day period while the Mg_2Si alloys have large aging increments the first day (Figs. 1, 3, 4) after quenching. It is well known[10,11] that relatively small amounts of iron inhibit room temperature hardening of wrought 4 per cent copper alloys, and commercial casting alloys of this type are similarly affected. A comparatively pure (0.19 per cent iron) 4 per cent copper casting alloy ages rapidly at room temperature[12] and on such an alloy different results would probably be obtained.

Summary of Results

The effects of various room temperature aging intervals between quenching and aging at elevated temperatures on some mechanical properties of several commercial aluminum sand casting alloys have been determined. The intervals studied have no effect upon the aging characteristics of commercial 4 per cent copper alloys. Alloys utilizing Mg_2Si (Al, 7 per cent, 0.3 per cent Mg and Al, 1 per cent Cu, 5 per cent Si, 0.5 per cent Mg) as a hardening compound have a pronounced reaction.

Heat treaters experiencing difficulty in surpassing elongation requirements on these alloys may improve this property by aging castings one day at room temperature after quenching before artificially aging them



at 310 F. If aging at elevated temperatures is conducted immediately after quenching, high strengths and hardness are obtained at the expense of elongation.

Acknowledgment

The work reported in this paper represents part of a program of research conducted at the Central Research Laboratory of the American Smelting and Refining Company for its Federated Metals Division.

The author wishes to acknowledge indebtedness for the constant guidance and continued interest of Dr. A. J. Phillips and Mr. A. A. Smith, Jr.

Bibliography

1. W. L. Fink and D. W. Smith, "Age Hardening of Aluminum Alloys," *Transactions*, AIME, vol. 122, p. 284 (1936).
2. W. L. Fink, D. W. Smith, and L. A. Willey, "Precipitation Hardening of High Purity Binary and Ternary Aluminum Copper Alloys," *Age Hardening of Metals*, ASM, p. 31 (1940).
3. M. L. V. Gaylor and G. D. Preston, "The Age Hardening of Some Aluminum Alloys," *Journal*, Institute of Metals, vol. 41, p. 191 (1929).
4. W. L. Fink, J. A. Nock, Jr., M. A. Hobbs, "Aging of 75S Aluminum Alloy," *Iron Age*, p. 64, Nov. 1 (1945).
5. F. R. Kostoch, "Aging Heat Treatments of 75S Aluminum," reviewed in *Iron Age*, p. 49, August 15 (1946).
6. R. A. Quadt, "Effect of Certain Elements on Mechanical Properties of 1 Per Cent Copper, 5 Per Cent Silicon, 0.5 Per Cent Magnesium Sand Cast Aluminum Alloy," AMERICAN FOUNDRYMAN, p. 21, July (1946).
7. W. Rosenhain, Discussion on Ref. 3, *Journal*, Institute of Metals, vol. 41, p. 239 (1929).
8. P. D. Merica, "The Age Hardening of Metals," *Transactions*, AIME, vol. 99, p. 13 (1932).
9. G. Masing, "Present Day Problems of Metallurgy," *Transactions*, AIME, vol. 104, p. 13 (1933).
10. W. Fraenkel, "Vergutbare Aluminumlegierungen," *Ztsch. Metallkunde*, vol. 22, p. 84 (1930).
11. H. Y. Hunsicker, "Precipitation Hardening Characteristics of High Purity Aluminum-Copper and Aluminum-Copper-Iron Alloys," *Age Hardening of Metals*, ASM, p. 56 (1940).
12. D. Hanson and M. L. V. Gaylor, "The Heat Treatment and Mechanical Properties of Alloys of Aluminum with Small Percentages of Copper," *Journal*, Institute of Metals, vol. 29, p. 491 (1923).

PAYMENT OF JULY 1st DUES MUST BE MADE WITHIN 90 DAYS

INVOICES FOR DUES of memberships subject to renewal on July 1 each year now are being prepared and soon will be mailed to several thousand members, requesting prompt payment in support of the Association's essential activities. In accordance with the by-laws and regulations of A.F.A., a full 90 days will be allowed for renewals, after which period it will be necessary to remove from the rolls the names of those members whose dues are three months in arrears.

Notice is hereby given that the 90-day period for payment of dues will be adhered to strictly in 1947. Invoices will be mailed in June, payable July 1. Statements will be forwarded on August 1 to all outstanding dues accounts, and on September 1 a "Final Notice" will be sent. Thirty days from the date of this "Final Notice," as required by the by-laws, those whose renewal checks have still not been received will be notified that they can no longer be accorded membership status, and the mailing of AMERICAN FOUNDRYMAN will cease.

Chapter secretaries and membership committee chairmen will be promptly notified as to all "delinquent" members as soon as possible after August 1, the final notice date, for purposes of local follow-up. Last year this could not be done in all cases, during the time the National Office was engaged in a complete revision of the membership records.

All members whose dues are again payable on July 1 are urged to give prompt attention to dues invoices, thus to avoid the inconvenience and annoyance of being required to reapply for membership after the 90-day period of grace has expired. It should be pointed out also that Art. II, Sec. 6 of the National by-laws states: "The resignation of a member whose dues are in arrears shall not be accepted." The prompt cooperation of all members will be of material assistance to the work of the chapters.

Let's make 1947-48 a "100% renewal" year! Your Association's program for the coming year is being planned along lines of increasing value to the entire industry.

Attendance List

The registered attendance list for the 1947 Convention, which was held April 28-May 1, Detroit, will soon be ready for distribution. It will contain the names of all members and guests who registered during the 51st Annual A.F.A. meeting.

The registered attendance list will be set geographically, i.e., state, city, company. Paper bound it will be available at $10.00 per copy.

FINISHING AND INSPECTION

MECHANIZED MALLEABLE FOUNDRY

D. F. Sawtelle
Metallurgist
Malleable Iron Fittings Co.
Branford, Conn.

IN THE WRITER'S MECHANIZED FOUNDRY, molds which have been poured, are dumped on a metal tray-type conveyor which takes them to a vibratory shakeout table. Here the castings are separated from the core material and most of the molding sand into which they were poured.

The shakeout table can be considered a crude sprue removing and cleaning operation in addition to its main function of separating the castings from the molding sand, as some of the castings break off at the gates. All but a small percentage of sand is removed at this point of the operation.

Sprue Removal and Cleaning

Castings are transferred from shakeout by another metal apron-type conveyor to two tumbling barrels connected with each other in series. Many of the larger castings are still red hot when they leave the shakeout. In the loading cycle, the conveyor elevates the castings so that they fall into the first of these barrels by gravity. This barrel, which is half full of water at approximately the boiling point, rotates counterclockwise for six minutes at the speed of 18 rpm. During this time the castings are continuously elevated and tumbled upon each other in and out of hot water.

At the end of six minutes this barrel reverses its direction and rotates clockwise for a period of four minutes. During this time the castings are ejected into the second barrel. While the castings are being ejected, the conveyor from the shakeout doubles its speed in order to quickly reload the first barrel.

The second barrel, in reality a large helix to level out the batches to a continuous flow, rotates continuously in a clockwise direction at a speed of 9 rpm. It takes in castings every four minutes from the first barrel and gives them a further tumbling and rinsing as they pass through. The castings are ejected in a fairly continuous flow, onto a rubber belt conveyor, which carries them directly to the inspection room.

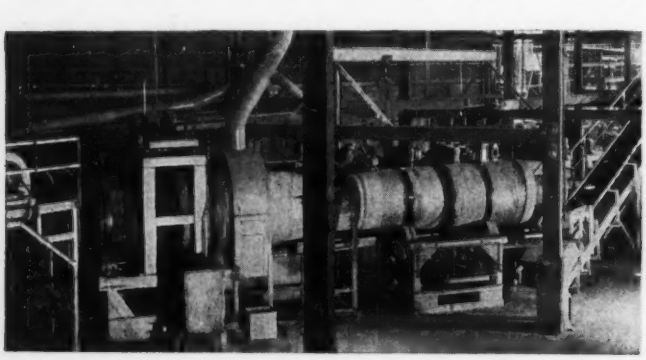
Figure 1 is a view of these tumbling barrels. At the extreme left can be seen an elevated platform and motor which is the end of the apron conveyor from the shakeout to the tumbling barrels. The castings travel through the barrels from left to right. At the end of the right hand or second barrel can be seen the rubber belt conveyor onto which the cleaned castings are ejected.

In Fig. 2, at left, is a casting with an average amount of sand still adhering to its surface, after it has passed over the shakeout table, but before it has passed through the tumbling barrels. Casting on the right shows the appearance after passing through the cleaning and spruing barrels. It may be noted that the sand nearly obscures the diamond shaped MIF trademark in the casting at left, while in the casting on the right it is plainly visible.

Preliminary Inspection

In passing through these tumbling barrels, the castings not only have had the sprue removed and have been cleaned well enough for inspection, but they have been cooled from nearly red-hot temperatures at which they entered the barrels, to around 120 F as they start their travel on the rubber belt conveyor to the inspection room. As they come from the barrel they are still wet but become dry after traveling only a short distance. The castings dry without rusting because a rust inhibiting compound is added to the water in the first barrel.

Figs. 1 and 2—Tumbling barrels and a typical casting.



A preliminary inspection is given the castings on the conveyor belt just as they come from the barrels. At this point, an inspector can detect trouble and bring it to the attention of the proper foreman soon after it makes its appearance. In this way defects can be discovered and corrected in current production. It is only 30 min. from the time the castings are poured until they reach this point. This is a great advantage over batch-type melting and floor molding practice where inspection takes place on the following day, when it often happens that the entire day's output of one or more molders must be scrapped.

From the barrels, the castings and sprue travel on the belt conveyor past the cupolas where the iron is melted. The first handling takes place at this point. The sprue is picked off the belt by 2 or 3 men, depending upon the volume of the day's melt which varies from 50 to 75 tons, and is tossed into a bin. From this bin or hopper it falls into the weighing buggy which makes up the cupola charges. The castings remain on the belt and proceed to the inspection and sorting room.

Figure 3 shows a view of the inspection room looking from the end at which the belt conveyor enters. The belt can be seen covered with castings at the extreme right in the foreground. It is clean before it has traveled half the length of the room. The girls at the right sort the different items into the pans as they come along on the belt. Some of the larger castings are also inspected at the same time. Directly underneath the belt and not visible in the photograph is a shelf which holds pans of work. Also, underneath the belt on the floor, and in back of the girls, are pans of sorted work on the floor.

The more difficult inspection jobs and castings which cannot be inspected as they are sorted, are inspected by the line of girls to the left working between the roller conveyor lines. This group of inspectors sounds many of the castings for cracks and uses chipping hammers, where advisable, to save finishing operations later on the annealed castings.

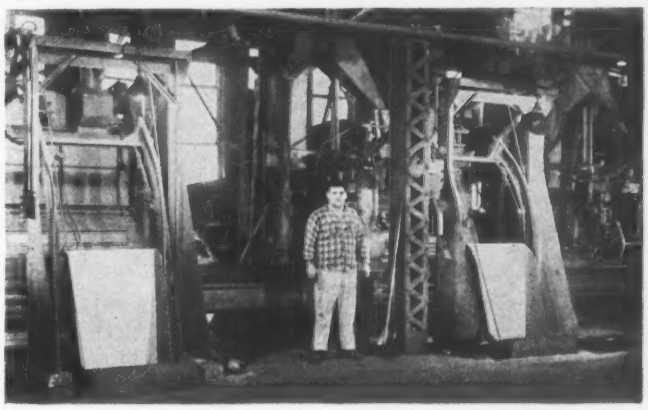
Steel Shot Cleaning

After inspection, the castings are weighed. The good castings pass in pans on roller conveyors to the annealing pot packing station, which is located just outside the inspection room. The emptied pans, after the castings have been loaded into pots for annealing, travel back to the inspection room by roller conveyor, entering to the right of the belt conveyor and running along the brick wall as can be seen in Fig. 3.

After annealing, the castings are given the final blast cleaning with steel shot in one of several types of machines. In these machines, the shot is impelled by centrifugal force onto the castings which are being tumbled about in a rotating barrel. The castings are transported from the annealing department in buckets suspended on an overhead monorail. These buckets hold all the castings contained in one stack of annealing pots. The load is transferred into skip hoists which in turn load the cleaning machines, one bucketful making one load.

Figure 4 shows the skip hoists, the cleaning machines, and between them a rubber belt conveyor, on

Fig. 3 (above)—View of inspection room. Fig. 4 (below) —Machines for final cleaning of castings after anneal.



which the castings are dumped after cleaning. They travel a short distance on this belt where they are given a final sorting, for they become mixed to a slight extent when they are packed in pots for annealing.

The castings are now ready for the removal of the gates. This is done by grinding or by shearing. The gates on over 60 per cent of the castings being made at the present time, are not ground, but removed by a shearing operation. Most of the grinding is done on double-ended stands. Each stand is equipped with a 10 hp motor with three changes of speeds. By use of these speed changes, the surface speed can be kept reasonably constant as the wheel wears down. A surface speed of 9,000 to 9,500 fpm can be maintained. The wheels as purchased are 24 in. in diameter, 3 in. wide, with a 12 in. center.

Grinding and Shearing Gates

Some of the larger castings are ground on a swing frame grinder using wheels of 20 x 2½ x 6 in. which also run at a surface speed of 9,000 ft. per min. Several portable, air-powered grinders which can be equipped with a wide variety of wheels shaped for getting into places not reached by the regular grinding wheels are also used. These air-powered grinders run at speeds of 6,000 to as high as 17,000 rpm, varying with the size of wheel with which they are equipped.

Figure 5 shows an operator at a machine used for shearing gates from the castings. This machine raises

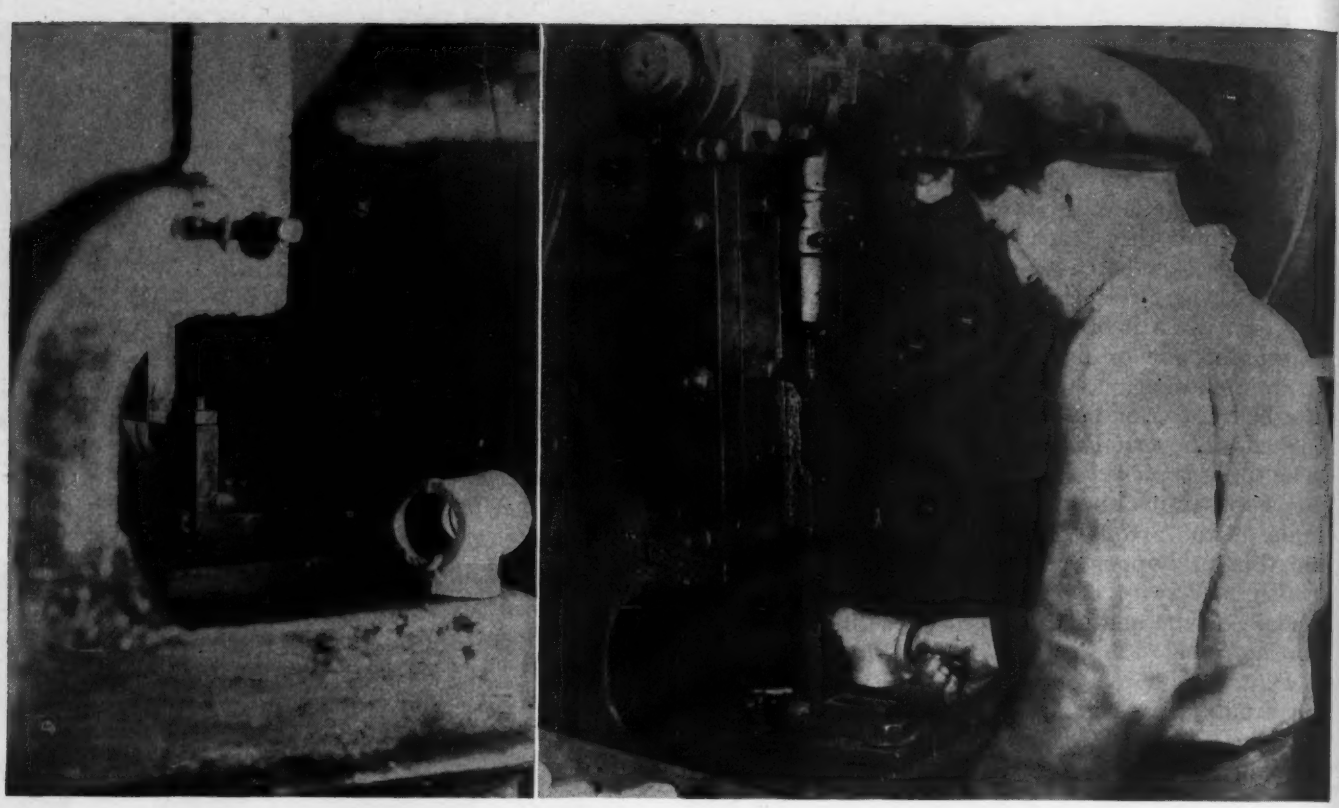


Fig. 5—Shearing machine (above) operation. Fig. 6—Close-up (left above) of shearing bed and blade. Fig. 7—Valve casting (left) before and after shearing.

and lowers a hardened steel blade a distance of ¾ in. at a rate of 80 strokes per min. The operator places the casting, gate down upon the semi-circular bed and up against the moving blade. As the blade descends, the protruding gate is evenly sheared off.

Figure 6 shows a rear view of the bed and the blade. The blade is made of a low-alloy tool steel of the following analysis: 0.90 per cent carbon, 0.50 per cent chromium, 1.25 per cent manganese and 0.50 per cent tungsten. These blades are hardened by quenching into oil at a temperature of 1475 F. The bed is also faced with a steel of the same composition and heat treatment.

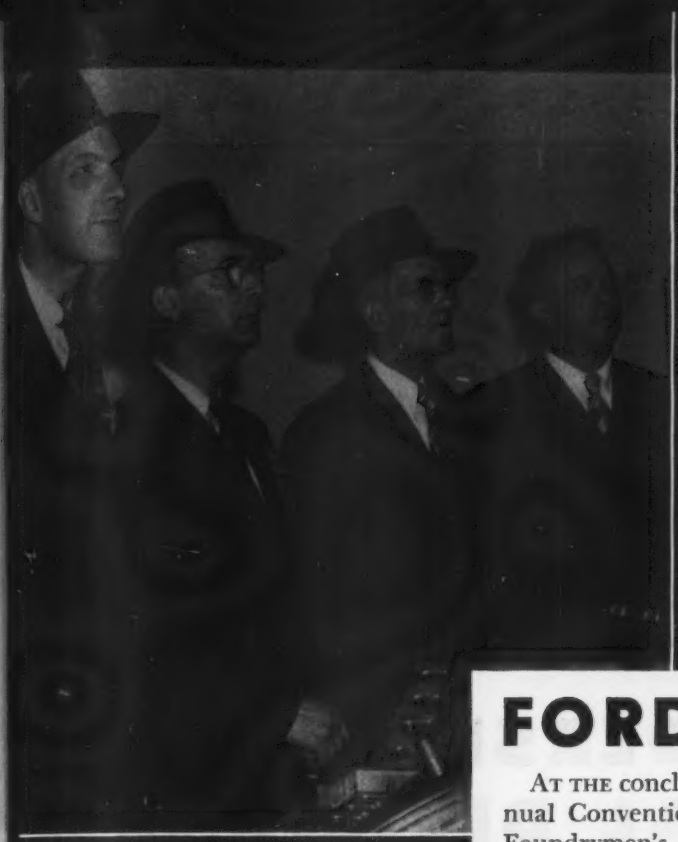
The cutting edge of these blades is ground at an angle of three degrees. However, they are one and a half degrees from the perpendicular, therefore, the angle or rake of the cutting edge is only one and a half degrees. The blades and beds are made and heat-treated in the machine shop. The average blade life is one year. When new, they are 4½ in. long, and are discarded when they have been reduced by repeated sharpening to a length of 2½ in.

Figure 7 shows two castings, at left, before the gate has been sheared off and, at right, after shearing. In between the castings are shown a few of the pieces which are sheared off in this operation.

The beds and blades can be changed on any one machine in a few minutes to take castings of a different size or shape. In many cases, it is necessary to change only the bed. The speed of the blade can also be changed from 80 to 160 strokes per min., to suit conditions of the particular job. While Figs. 5 and 6 show a machine set up with a bed and blade for shearing, the same machine can be quickly fitted with a punch and die. This combination is also used in shearing the gates from some types of castings. The punches and dies are made of the same steel and given the same heat treatment as the blades and the steel with which the beds are faced.

The speed with which gates are sheared is two, three, or even four times faster than grinding, varying with different jobs. Very small gates can be ground nearly as fast as they can be sheared, though even the small light gates require more physical effort in grinding than in shearing. Gates are sheared off castings as large as 3 in. pipe fittings. The shearing operation on a casting of this size is four times as fast as grinding, and requires much less physical effort.

As to comparative costs, a blade, or a bed facing, or a punch and die combination, can be made in the machine shop, ready to be used, in about eight man-hours, and, as has been stated, the life averages about one year. In comparison a grinding wheel costs $44.00 at present, and its average life is only one week.

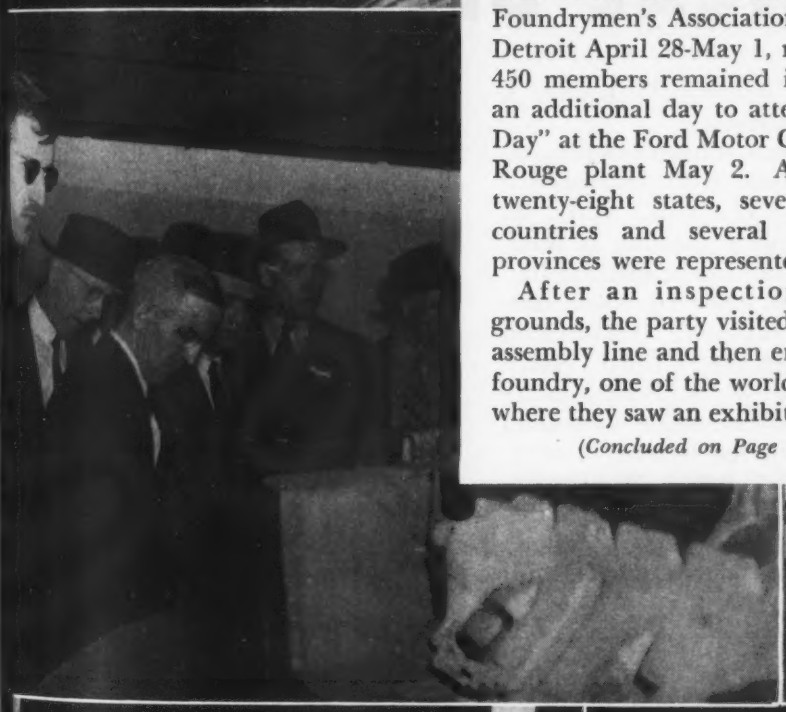


FORD DAY

AT THE conclusion of the 51st Annual Convention of the American Foundrymen's Association, held in Detroit April 28-May 1, more than 450 members remained in Detroit an additional day to attend "Ford Day" at the Ford Motor Company's Rouge plant May 2. A total of twenty-eight states, seven foreign countries and several Canadian provinces were represented.

After an inspection of the grounds, the party visited the Ford assembly line and then entered the foundry, one of the world's largest, where they saw an exhibit prepared

(Concluded on Page 83)



R. G. McELWEE
Vice-Chairman
Gray Iron Division

L. J. WISE
Chairman
Malleable Division

W. B. McFERRIN
Vice-Chairman
Malleable Division

P. E. KYLE
Vice-Chairman
Sand Division

ASSUME LEADERSHIP OF A.F.A. TECHNICAL DIVISIONS

DURING THE 51st Annual A.F.A. Convention held in Detroit seven out of the eight A.F.A. divisions that held business meetings announced their new slate of officers. Chairmen and vice-chairmen for 1947-49 were elected by the following divisions: Brass and Bronze, Educational, Gray Iron, Malleable, Pattern, Sand and Steel. Officers terms of office extend from July 1 of this year through June 30, 1949.

Named chairman and vice-chairman, respectively, are: Brass and Bronze, Walter E. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee; George P. Halliwell, director of research, H. Kramer & Company, Chicago.

Educational, Fred G. Sefing, research metallurgist, International Nickel Co., New York; Alfred W. Gregg, technical assistant to president, Whiting Corp., Harvey, Ill.

Gray iron, Russell J. Allen, metallurgical engineer, Worthington Pump & Machinery Corp., Harrison, N.J.; R. G. McElwee, foundry alloy division manager, Vanadium Corp. of America, Detroit.

Malleable, Leon J. Wise, assistant to the president, Chicago Malleable Castings Co., Chicago; William B. McFerrin, metallurgist and district service manager, Electro Metallurgical Co., Detroit.

Pattern, Albert F. Pfeiffer, pattern and foundry division, Allis-Chalmers Mfg. Co., West Allis; Leonard F. Tucker, president, City Pattern & Foundry Company, South Bend, Indiana.

Sand, Dr. H. Ries, Ithaca, N.Y.; Professor Peter E. Kyle, Cornell University, Ithaca.

Steel, Laurence H. Hahn, metallurgical supervisor, Sivyer Steel Casting Co., Chicago; Charles Locke, chief metallurgist, West Michigan Steel Foundry Company, Muskegon, Mich.

W. W. Edens

Walter W. Edens, born in West Allis, Wis., received his degree of Bachelor of Science in mechanical engineering from Marquette University, Milwaukee (1934) and his Master of Science in metallurgical engineering from the University of Wisconsin, Madison (1937).

He joined Heil Co., Milwaukee, as engineer in 1936, leaving the following year to begin a lengthy association with Ampco Metal, Inc., as chief metallurgist and technical director. In June, 1947, he became connected with Badger Brass & Aluminum Foundry Co., Milwaukee.

Brass and bronze division vice chairman and program and papers committee head for the past two years, Mr. Edens has also been active on editorial committees for A.F.A.'s handbook on RECOMMENDED PRACTICES FOR SAND CASTING OF NON-FERROUS ALLOYS. He is also a director of the association's Wisconsin chapter and chairman of its brass and bronze program group.

A frequent speaker before meetings of technical and scientific groups, he has also contributed to the trade press. He holds membership in the American Society for Metals, is a past chairman of its Milwaukee chapter and prepared the centrifugal casting section of its new handbook. Mr. Edens is also a member of AIME and American Society for Testing Materials.

G. P. Halliwell

George P. Halliwell, a native of Providence, R.I., attended and received his Bachelor of Science degree in chemistry from Worcester Polytechnic Institute, Worcester, Mass., (1915) and his Master of Science in metallurgy from Yale University, New Haven, Conn. (1920).

His first industrial connection was with the Bridgeport (Conn.) Brass Co., which he joined as a chemist in 1916 and left in 1920 to accept a position as metallurgist with Westinghouse Electric Corp. at East Pittsburgh, Pa. In 1930, Mr. Halliwell joined the faculty of Carnegie Institute of Technology, Pittsburgh, Pa., as assistant professor of metallurgy and taught there until 1935. He began his association with H. Kramer & Co. in 1936.

In A.F.A.'s Brass and Bronze Division, Mr. Halliwell has served on the research committee and as vice-chairman of the program and papers group. He is also a member of the association's national committee on fluidity testing.

He has spoken before meetings of scientific groups on such subjects as cold working and recrystallization of copper, and the effect of impurities on rolling of copper.

F. G. Sefing

Fred G. Sefing received his Bachelor of Science degree in metallurgical engineering from Lehigh University, Bethlehem, Pa., in 1919; his Master of Science degree from Pennsylvania State College, State College, Pa., in 1924.

His industrial background includes association with Hudson Motor Car Co., Detroit, and Rockford (Ill.) Drop Forge Co. as metallurgist; Pennsylvania State College as chemical metallurgist, and Michigan State College, East Lansing, as metallurgist, in that order. He joined International Nickel Co. at Bayonne, N. J., as research metallurgist in 1937.

As an instructor at Michigan State College he directed many research and production technologists and engineers into the foundry field. While there Mr. Sefing also was instrumental in developing the series of regional foundry conferences sponsored by A.F.A.'s Detroit chapter and held at the college.

He is well known to the foundry industry as a writer and speaker on such subjects as core strengths, grain size, structure of cast iron, melting characteristics of brass and bronze, and superheating of cast iron. A frequent contributor to the technical and trade press, he also has addressed numerous meetings of technical societies. In addition to his A.F.A. affiliation, he holds membership in the ASM.

Chairman of A.F.A.'s committee on cooperation with engineering schools for a number of years, Mr. Sefing was first chosen to head the educational division at its organizational meeting last fall. He is a member of the gray iron division advisory group and a past chairman of the association's Metropolitan chapter.

A. W. Gregg

Alfred W. Gregg is a native of Riverside, Ill., and obtained his Bachelor of Science (1903) and Master of Science (1904) degrees from Purdue University, Lafayette, Ind.

He began his industrial career as a metallurgist with Latrobe Steel Co., Melrose Park, Ill.; was associated for some fifteen years with Bucyrus-Erie Co., South Milwaukee, as foundry superintendent, and with Bonney-Floyd Co., Columbus, Ohio, as superintendent, 1929-36. He was foundry superintendent for Whiting Corp. from 1919 to 1923, and rejoined the firm in 1936 as executive engineer in the foundry equipment department.

A frequent speaker at A.F.A. meetings and conventions, Mr. Gregg has also written for the trade press on such subjects as heat treating, converter practice, triplexing, cupola operation and charging equipment. In 1944 he was awarded the John H. Whiting Gold Medal of A.F.A. He also holds membership in the AIME and the ASM.

At last fall's organizational meeting of the A.F.A. Educational Division, Mr. Gregg was named vice-chairman and head of the program and papers committee, in which capacity he continues for the coming two-year term. He is also a member of the steel division executive committee.

R. J. Allen

Russell J. Allen, native of Port Huron, Mich., received his Bachelor of Science degree from the University of Toronto, Toronto, Ont., Canada, in 1913.

He joined Worthington Pump & Machinery Corp. as a metallurgical engineer in 1929 after a previous association, dating from 1918, as metallurgist with Rolls-Royce of America, Inc., Springfield, Mass.

Long active in gray iron technical committees of American Foundrymen's Association, he is the 1947 recipient of the society's John A. Penton Gold Medal for, the citation reads, "his earnest and unceasing contributions to the advancement of gray iron metallurgy."

Although he has written on metallurgical subjects, Mr. Allen has placed major emphasis on cooperative activities as a force in the dissemination of scientific information. For the past two years he has been gray iron division vice-chairman and program and committee head, as well as chairman of the committee on high temperature properties of cast iron.

His affiliations with other technical societies include membership in the Institute of Metals (British), AIME, ASM, American Society for Testing Materials and the American Welding Society.

R. G. McElwee

R. G. McElwee is a native of Williamsport, Pa.

Identified with the foundry industry for 30 years, he began his career with Muncie (Ind.) Foundry & Machine Co. as chief inspector. He spent 11 years as buyer for General Motors Truck Co., Pontiac, Mich., and has also been associated with American Car & Foundry Co. at Detroit; Whitehead & Kales Co., River Rouge, and Ecorse (Mich.) Foundry Co., resigning as general manager of the last to join Vanadium Corp. of America as a metallurgist.

Chairman of A.F.A.'s cupola research committee, Mr. McElwee has served on the gray iron division executive committee and as vice-chairman of the program and papers committee. He has presented papers at meetings of several technical societies and holds membership in the ASM, as well as American Foundrymen's Association.

L. J. Wise

Leon J. Wise was born in St. Louis, Mo., and went to Washington University, St. Louis.

Graduating in 1922 with the degree of Bachelor of Science in chemical engineering, he joined National Malleable & Steel Castings Co. at East St. Louis as a chemist. After two years there, Mr. Wise spent similar periods with Muncie (Ind.) Malleable Foundry Co. and with Terre Haute (Ind.) Malleable Mfg. Corp. as chemist and metallurgist, respectively.

In 1928 he became metallurgist for Chicago Malleable Castings Co. and its affiliate, Allied Steel Castings Co., Harvey, Ill. He advanced to assistant sales manager for the two firms in 1933; manager of industrial sales in 1935. Mr. Wise was appointed assistant to the president at Chicago Malleable and general manager at Allied Steel in 1945.

Past chairman of the Chicago chapter of

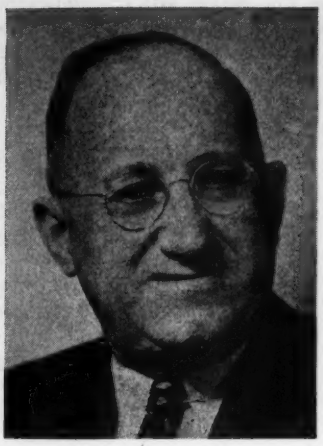
W. W. Edens
Chairman
Brass & Bronze Division

F. G. Sefing
Chairman
Educational Division

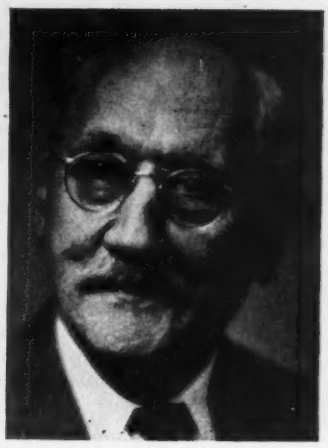
R. J. Allen
Chairman
Gray Iron Division

L. H. Hahn
Chairman
Steel Division

A. W. GREGG
Vice-Chairman
Educational Division



A. F. PFEIFFER
Chairman
Pattern Division



DR. H. RIES
Chairman
Sand Division

G. P. HALLIWELL
Vice-Chairman
Brass & Bronze Division

A.F.A., he also headed the committee that launched the chapter's popular annual lecture course series. He has served, recently, on the malleable division executive group.

Including membership in ASM and ASTM among his affiliations with technical societies, Mr. Wise is also interested in trade groups. He is a past director of the Malleable Founders Society and a member of the Steel Founders Society of America.

W. B. McFerrin

William B. McFerrin, born in Greenville, Ala., attended county grade schools and Butler County high school, then enrolled at Alabama Polytechnic Institute, Auburn.

Moving to Detroit in 1929, where he became associated with Cadillac Motor Car Div., General Motors Corp., as assistant foundry chemist, he continued his studies at the University of Detroit, Detroit, and received the degree of Bachelor of Science in metallurgical engineering in 1932.

He remained with the Cadillac firm until 1944, advancing to foundry chemist in 1933; foundry metallurgist and foreman of melting, 1934. During the war he was on special assignment on problems relating to cast steel armor for tanks. Mr. McFerrin joined Electro Metallurgical Co. in his present capacity in 1944.

A frequent speaker before A.F.A. meetings and contributor to its publications, he has also written for the trade press. His topics have included defects in gray and malleable iron castings, defects common to automotive cast iron and cupola melting practice.

He is the present vice-chairman and program and papers committee head of A.F.A.'s malleable division, as well as co-chairman of the analysis of castings defects committee and member of the chill test group.

In addition to American Foundrymen's Association, Mr. McFerrin is affiliated with the AIME, American Society for Metals, Association of Iron & Steel Engineers, Engineering Society of Detroit and Society of Automotive Engineers.

A. F. Pfeiffer

Albert F. Pfeiffer, born in Dunmore, Pa., attended the Scranton (Pa.) Business College and the University of Wisconsin. He was graduated by the extension division of the university in 1918.

Associated with Allis-Chalmers Mfg. Co. for 41 years, Mr. Pfeiffer joined the firm at Scranton and five years later transferred to the West Allis, Wis., plant, where he has been located since.

For the past two years he has been vice-chairman of A.F.A.'s pattern division and program and papers committee head. He is also a director of the association's Wisconsin chapter. A frequent and popular speaker at A.F.A. conferences and chapter meetings, he has also addressed many vocational and trade school, university, and engineering groups on pattern equipment and techniques of its application with various metals.

L. F. Tucker

Leonard F. Tucker is a native of Hamilton, Ont., and received all his schooling there before moving to Detroit in 1919 to begin his patternmaker's apprenticeship with Studebaker Corp.

On completion of his four year apprenticeship, he remained with Studebaker as a patternmaker for another 12 years, moving with the organization to South Bend, Ind., in 1926. In 1935 Mr. Tucker organized his firm, City Pattern Works, at South Bend. The firm was incorporated as City Pattern & Foundry Co. in 1945.

Interested especially in promotion of closer relationship between patternmaker and foundryman, Mr. Tucker has concentrated his efforts toward this objective in the technical-educational programs of A.F.A. He has prepared technical papers for the society on pattern rigging for production molding and cooperation between pattern shop and foundry and has taken an active part in its local, regional and national meetings.

He has served as a member of the pattern division executive committee for the past two years. Mr. Tucker is affiliated with the Michiana chapter of A.F.A. and is one of the most enthusiastic supporters of its undertakings.

Dr. H. Ries

Dr. H. Ries, native of Brooklyn, attended Columbia School of Mines, New York, where he received his Ph.B., M.A. and Ph.D. degrees.

An instructor at Cornell University, Ithaca, N. Y., from 1898 until his retirement in 1939, he was head of the geology department there from 1914 to 1937.

The study of clays and sands has been the special interest of Dr. Ries and he has prepared numerous reports on these materials for state, national and Canadian geological surveys. He is also the author of several books on clays and economic and engineering geology and has prepared numerous technical papers for scientific groups and the technical and trade press.

In 1936 he was awarded the Joseph S. Seaman Gold Medal of A.F.A. in recognition of his work in sand research. He has been associated with the society's sand investigational groups since 1921.

A past director of A.F.A. (1933-36), Dr. Ries has also served as technical director of the association's committee on molding sand research, chairman of the sand research project and head of many groups involved in that study.

He is a member of the AIME and former chairman of its committee on nonmetallic minerals, a member of the Canadian Mining Institute, American Ceramic Society (of which he is past president) and Geologic Society of America and a fellow of the English Ceramic Society.

P. E. Kyle

Peter E. Kyle is a native of New Hampshire. Born in Lakeport, he was associated with Scott & Williams, Inc., at Lakeport as a machinist apprentice.

Joining Westinghouse Electric Corp. at East Pittsburgh as a student engineer, he also attended Carnegie Institute of Technology, Pittsburgh, before enrolling at Cornell University in 1929. Receiving his

(*Concluded on Page 84*)

NEW PROCESS CHEMICALLY TREATS MOLDING SAND

Thomas W. Curry
Metallurgist
Lynchburg Foundry Co.
Lynchburg, Va.

AFTER MORE THAN A YEAR of experimental work in adapting a chemically treated sand process to large scale gray iron foundry operation, the Lynchburg Foundry Co. went into full production early this year. The actual beginning of a production run, and continuation of the use of the new process until the present time, was the culmination of an extensive program of study and work.

Results to date have been most encouraging, and the application of the chemically treated sand has had a pronounced effect upon all of the operations performed in the making of gray iron castings in this foundry. The problem of obtaining good sand properties and control for the mechanized molding units, together with the desire to improve the quality of the casting, were the initial reasons which led to the experimental work on the chemically treated sand.

During the experimental period, the results of shop tests indicated that certain desirable sand properties could be obtained through the process, but not until the management had reviewed the results of all the shop and laboratory tests collectively, and authorized a trial production run, was it possible to realize the numerous improvements resulting from this development. To afford an idea of the effect that the new sand process has had on foundry operations, there follows a list of some of the advantages of the chemically treated sand over the synthetic sands previously used in the same molding units.

Summary of Advantages

1. Time necessary to prepare the sand in the mullers has been reduced and more sand can be supplied to the molding machines. With the synthetic sands, the mixing cycle was 2.2 minutes, which consisted of 1.5 minutes of mulling, after all components of the mixture had been added to the muller, and 0.7 minutes for loading, adding bonds, and unloading. The chemically treated sand requires only a 1.4 minute cycle with 50 seconds mulling of all the components, and, during a 4-hour breakdown on one muller, the mulling time was reduced to 30 seconds, with no unusual or abnormal effects. This faster mixing of the sand provides ample sand for the molding machines, properly mixed, where-

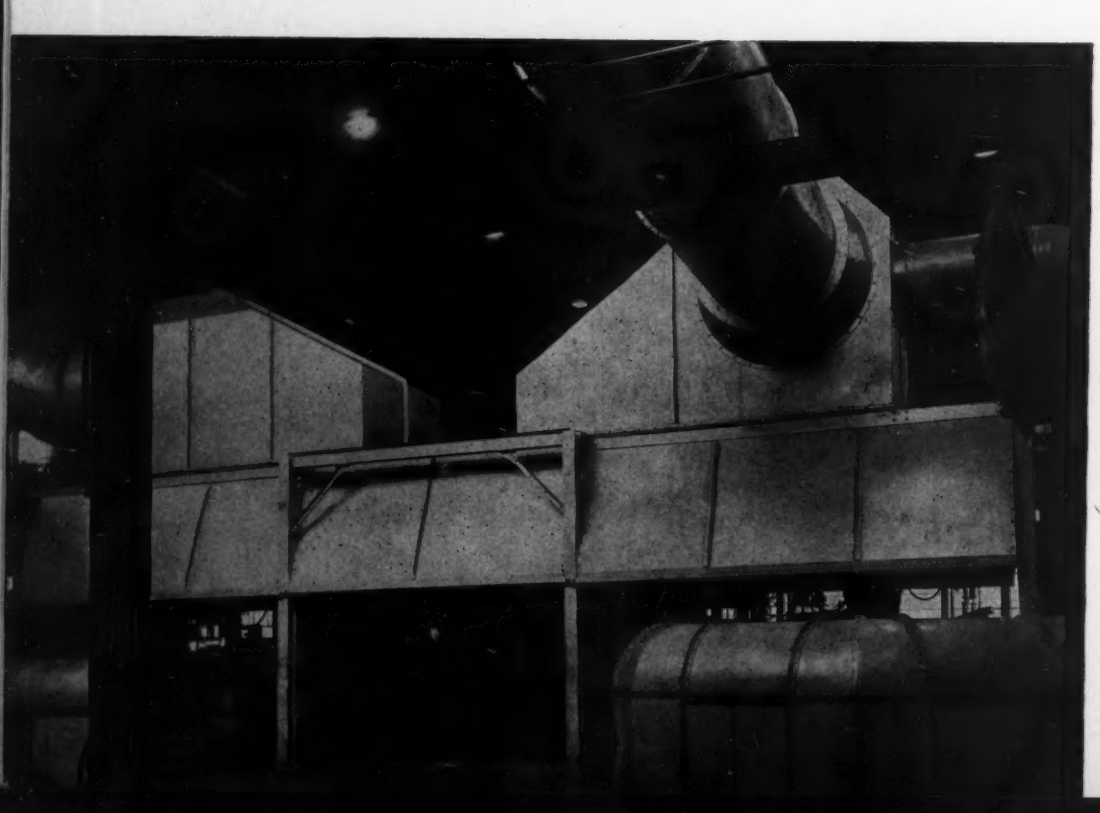
Drag mold of tractor wheel showing the size and depth of one of the sand lifts made on the jolt - squeeze - strip molding machines. In the synthetic sand, there was the problem of making the sand sufficiently tough to lift out of the wide deep pocket and ram hard enough in the close space between rim of the wheel and the flask.

as with the synthetic sands, it was necessary to add additional bond and cereal, without sufficient mulling time, and accept the accompanying detrimental effects of improper mixing. The additional supply of sand increased the potential mold production and sharply decreased the time lost waiting for sand.

2. The chemically treated sand has better flowability characteristics than any synthetic sand previously used. The improvement in this property enables the mold to be made with a higher and more uniform hardness throughout, with fewer jolts of the molding machine and less ramming. A reduction in soft-rammed areas, with the reduction in the resulting metal penetration and the loss of correct contour, has materially improved the surface finish and held the overall dimensions more closely within the specified tolerances. Prior to the use of chemically treated sand, in an effort to improve flowability there had been an investigation of combinations of southern and western bentonites and fire clays, as bonds, with cereal flours, wood flours, sea coal, pitch, sands of various fineness numbers and grain distribution, and facing materials.

Flowability and Toughness

3. The toughness of the chemically treated sand can be increased to a specification which will mold on all of the current patterns without affecting its good flowability properties. In other words, a tough, highly-flowable sand is now possible, two properties which in most sands are not compatible. Most of the work involves deep, intricate lifts, as both the cope and the drag are made on jolt-squeeze-strip molding machines, and one of the major problems on the molding units was to provide a sand which would lift from a deep pocket and, at the same time, ram uniformly hard on all mold surfaces. In the synthetic sands, it was necessary to keep the toughness of the sand as low as possible to maintain a good surface, and the loss of molds, due to stick-downs coming from the molding machines, was high. The tough, flowable characteristics of the chemically



Tractor wheel mold (top left) entering the fume tunnel going to the shakeout station. A measured amount of uncoated silica sand (white material on mold top) is added to mold to maintain grain fineness and the amount of sand carried in the unit system. A.F.A. Fineness No. 60 sand (center) shown at 20 diameters. Note how the micro-thin coating of an almost pure carbon resin is spread and maintained around the sand grain. Resin coating is hard and durable. Left—view of the shakeout end of No. 2 and No. 3 loops showing exhaust system.

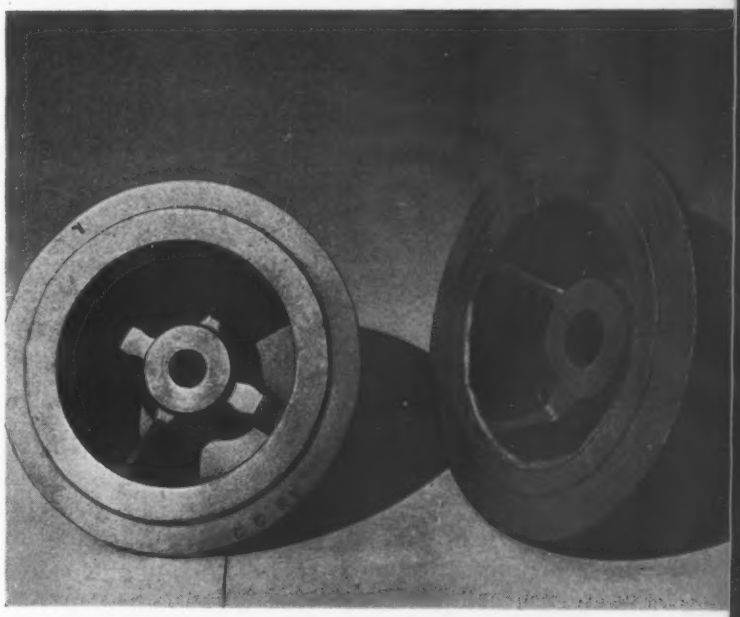
treated sand have reduced this loss of molds appreciably, resulting in increased production.

4. High strength, or high toughness, whichever is desired, can be developed in the chemically treated sands at much lower moisture contents. Here again, a third "incompatible" arises, namely, a tough, high-flowable sand at a low moisture content. The synthetic sands were discharged from the mullers with moisture contents between 5.5 per cent and 5.8 per cent, and the chemically treated sand has a good temper at 3.0 per cent to 3.3 per cent. A reduction in the amount of water vapor during the pouring operation is a definite advantage. In the opinion of the writer, the solvent used in the new process begins to evaporate from the face of the mold when the mold comes from the pattern, and the gases, incident with the burning of the carbon resin and the solvent, are slower in forming than in the synthetic sands. Hence, less water vapor and slower forming mold gases, during pouring, require less permeable sands, and a finer finish for larger castings can be obtained.

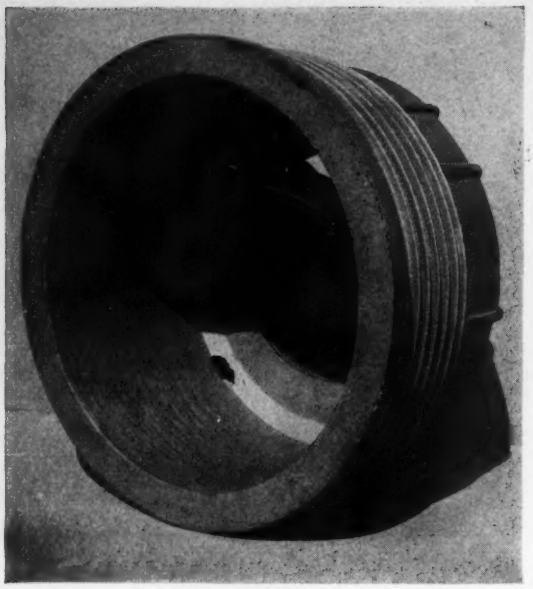
Sand Use Range Extended

5. By virtue of the use of a finer grained sand with good flow properties and lower permeability requirements, it is possible to extend the use of a single sand over a wider range of castings. The three molding units in the company's gray iron foundry are serviced by common distribution belt and shakeout conveyor and, since the larger loop uses the larger flasks and usually makes the heavier castings, it becomes the dominating loop with its influence on the properties of the sand. It was therefore necessary, to maintain good finish and, in some cases, prevent misruns, to use facing sands for most of the smaller castings. The manner in which the refractory carbon resin is distributed around each grain, and the time of the mold gas formation, as previously explained, imparts almost the same cleaning action to a thin, light casting as is obtained on a heavy, thick-sectioned casting. This property has provided the means to eliminate facing operations entirely and increase the mold production proportionately.

6. Lumping has been largely eliminated. Insufficient mulling time and the use of an excess of bond and cereal flour, over and above that amount which would normally develop the required working properties, causing lumping, poor finish, and increased the sand costs by the waste when these lumps were screened out



Top—Cope side of 257-lb tractor wheel casting (drag mold of this casting is shown on page 51). Close dimensional tolerances are required on the outside diameter of the rim and soft ramming in the vicinity of the gate (extreme right) would cause extra grinding. Center—Cope side of a tractor drum weighing 100 lb. In this casting, the surface finish of the four deep pockets shown must be smooth, free from sand, and held to close dimensional tolerances because machining operations are jigged from these points. Right—Metal penetration on the visible end because of poor flowability, misruns due to high sea coal content and rough finish were experienced on this type of casting in synthetic sand.



Drag view of automotive brake drum casting weighing 88 lb. Molding, gating and finish factors require a sand having good hot strength, toughness, flowability.

Drag view of 335-lb. tractor sprocket wheel with metal sections ranging up to 5-in. thickness, and poured through pop gates over top of the center hub core.

of the shakeout sand. Other obviously undesirable features also accompanied this condition of the synthetic sands in the former system. At no time during the continued production run of the chemically treated sand was there evidence of any degree of lumping. This has had a threefold effect: (1) the shakeout sand returning to the mullers is in a much better condition for remixing; (2) the refuse sand has been limited to pieces of broken cores, which can be considered as a normal waste unless special reclamation equipment is available; and (3) the better surface finish of the casting.

7. Bond and cereal additions at the mullers have been reduced with the processed sand. Average additions of 3.4 lb bentonite and 1.4 lb cereal flour to an 1100-lb batch of synthetic sand have been reduced to 1.7 lb bentonite and zero to 0.3 lb maximum of cereal flour. Sea coal, pitch, and other dry carbonaceous materials have been entirely eliminated. The cost of the sand per batch, however, has been increased because of an average addition of 4 lb of the processing chemical, but the numerous advantages offset the cost increase of the sand and return a substantial daily saving.

Sand Control Factors

8. More accurate muller control has been made possible. Reduced moisture content, smaller amounts of bentonite and cereal, the elimination of sea coal and pitch, with their troublesome residues and waterproofing effects, and the tolerance available in the mulling cycle, make the chemically treated sand easier for the muller operators to control within a given set of specifications. The sand supervisor has a more difficult job of control because all the working properties are dependent upon the chemical coating on the sand grain and the grain distribution, which materially affects the working surface area. It is imperative that the coating around the sand grain be maintained by sufficient additions of the chemical to counteract any circumstances which allow uncoated sand grains to enter the sand system, and control the grain distribution for the most efficient working and refractory properties.

9. In general, there has been a reduction in cleaning time with the use of chemically treated sand, some castings being affected more than others. The good shakeout and refractory properties deliver castings to the cleaning room with a minimum of molding sand, and this has greatly improved the work station where the castings are prepared for subsequent cleaning operations, by reducing the amount of sand to be handled. Sand-blast time has been cut as much as 50 per cent in some cases, and substantially reduced for all castings. The subsequent grinding, for appearance, of areas having metal penetration due to lack of flowability also has been reduced.

Mold Loss Reduced

10. The men engaged at work on the mechanized unit are in hearty accord with the change to the chemically treated sand. The reduction in dry materials and the elimination of sea coal and pitch in the sand mixtures has elicited favorable comment from the sand mixing crews. The reductions in ramming, less time lost waiting for sand, and fewer losses of molds coming from the molding machines, could only produce favorable reactions. There are more fumes created at the shakeout, but they are not toxic, are much lighter, and seem to pass out through the exhausts much more rapidly than those formerly associated with synthetic sand containing sea coal. The volume of fumes does not seem to affect the shakeout crews, and, as a whole, the shakeout operation has been simplified somewhat by the sand leaving the castings much easier. The general shop atmosphere, we believe, is cleaner.

The chemical-treatment process for the preparation of molding sands is an entirely new conception of the function of the grains of sand in the making of a mold. It is concerned with the surface of the grain, rather than the grain as a whole, both from the standpoint of

refractoriness and all functional properties. A good working knowledge of the process can be had when just the mechanical aspects, which may or may not be the result of a chemical reaction, are considered.

Consideration must first be given to the fact that the process (the chemical used is secondary to this) uses a coating on the sand grain for refractory and working properties. With this in mind the chemical, for explanatory purposes, can be considered a physical mixture instead of a complex chemical composition. Therefore, the chemical in use at the present time may be defined as a viscous liquid containing a high-carbon resin, a solvent, and water.

Coating Process Defined

Originally, the treatment process and its chemicals were designed to produce molding properties in a sand without the use of bentonite or clays, cereal, or water. All plasticity was derived from the action of the solvent on the carbon resin coating; hence, the frequent reference to non-water soluble sand coating, in the early stages of the development. The treated sands, using the non-water soluble material, were found to be of an inflammable nature, because of the high solvent content, and were temporarily set aside in favor of the water-soluble chemical.

Initial operations of the process consists of coating the sand grain with a micro-thin film of the high carbon resin. This is accomplished by mixing a washed and damp silica sand with a proportionate amount of the water-soluble chemical in the ordinary foundry mixer. The mixture is then passed through a rotary drier, operating at 300 to 350 F, to evaporate the solvent and water vapor and set the coating on the grain. In this phase of the procedure the solvent is only a vehicle to convey the carbon resin around the grain, and is recoverable from the vapors coming from the drying operation.

The sand at this stage has no plasticity or molding qualities and could be compared with washed and dry silica sand, with the exception of the color. The sand grains are now brownish-black instead of translucent to white. Under a microscope, the newly coated sand appears to be a glistening black, and the thin coating has not obliterated the original contour and angular formation of the sand grains. The carbon resin, or coating, is a hard, durable material, insoluble in water and common solvents, tenaciously attached to the grain so that it is not apt to spall or break off, but will become plastic in contact with the solvent of the water-soluble chemical. It is the latter property of the coating, the function of its becoming plastic, that is the primary source of all of the desirable qualities found in the chemically treated sand.

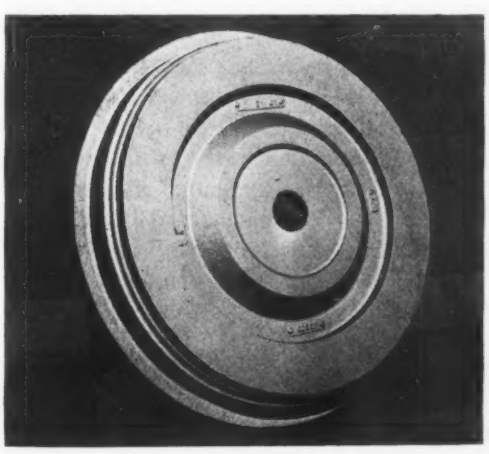
The coated sand is then ready to be introduced to the molding unit, where it is subsequently mixed with bentonite, cereal, the water-soluble chemical and water to develop the working properties necessary to make its first mold. Continued re-use of the chemically treated sand requires only maintenance additions of bentonite, cereal and the chemical to hold the specifications.

Uncoated sands, namely, new silica sand, core sand, or the grains adjacent to the molten metal which have had the coating burned off, enter the sand system and are coated in the cycle of mulling with the chemical in the mixture, and using the heat of the molten metal, back of the face of the mold, to evaporate the solvent and water vapor. Hence, during the making, pouring, and shakeout of a mold, the coating is burned off of some sand grains and replaced on others, so that the percentage of coated grains can be kept in good balance by the chemical addition in the mullers.

Summary and Conclusions

The Lynchburg plant of the company employs approximately 900 people—production workers operating on an incentive pay system—and turns out about 3500 tons of castings per month. The molding, pouring, cleaning and core departments are operated 24 hours a day, 6 days a week.

Cope side of an automotive flywheel (below) weighing 170 lb with metal sections ranging from 2 to 3½ in. in thickness. The cored hole is made with green sand and the drag side has a wide expanse of flat surface. Drag view (right) of 186-lb rotary compressor casting. Metal sections range from 1½ to 3 in. in thickness.



Fractional horsepower motor end castings weighing 3½ to 4½ lb with $\frac{5}{16}$-in. metal section thickness.

Finned refrigeration compression cylinder weighing 86 lb requires sand with good flowability properties.

The economic advantages obtained from the use of chemically treated sand as disclosed by operations at the company's foundry are as follows:

1. Due to its increased flowability and toughness, molds can be made more quickly and with less jolting.
2. The characteristics of the sand can be controlled more readily and closely and the milling time is less than with conventional sand. This results in increased capacity for molding and sand-mixing equipment.
3. The same sand can be used for both large heavy castings and small light castings, giving a greater flexibility to the system.
4. Finer sand, with a lower moisture content, can be used; producing a cleaner, smoother casting surface and less vapor pressure in the mold.
5. Facing sand, spraying or skin drying are not required to facilitate clean peeling of the sand to obtain a good surface finish on the casting. This means a better product with a reduction in labor and equipment.
6. As there is much less black dust and smoke in the air, working conditions are better.
7. At the shakeout, the sand shakes free from the casting and flask in less time and with less effort, thus reducing the time and labor required.
8. Due to the cleaner surface of the metal, the shot-blasting time has been reduced to from 50 to 35 per cent of the former time, and the grinding time has also been reduced 10 per cent. This decreases labor cost and increases the capacity of the cleaning department.
9. Because of better molds and cleaner surfaces, the scrap loss is reduced.
10. Because the castings are smoother and cleaner, the customers have expressed greater satisfaction with their appearance, and it is believed that the castings will machine better.
11. The cost of chemically treated sand in a given mold, at present, is greater than for conventional sand, but the resulting economies indicate a lower over-all expense.
12. No additional equipment is required for the use of the process, and the sand and molding system at the Lynchburg foundry was changed over in 8 hr on a Sunday without loss of production.

The following figures were given by the company as the savings shown by 6 weeks' use of chemically treated sand in the sand system feeding the short mold conveyors and covering about 3000 tons of castings per month. Some of these figures would have been different had the mechanical equipment been specifically designed for this sand.

1. Down time, waiting for sand or other delays—daily saving about $185 (6 per cent on total lost time).
2. Reduced time on the molding line due to better moldability and ramming—daily saving in labor and departmental burden, $192 (time study showed a 10 per cent saving).
3. Cleaning costs reduction, 23.5 per cent—daily saving, $105.
4. Because of 16 per cent increase in production the over-all foundry burden was reduced to show a daily saving of $136.

From the foregoing figures, the total saving for 24-hr operation is shown as $618. From this must be deducted the additional cost ($350) of the chemically treated sand, leaving net daily savings of $268.

Sand Life Indefinite

Formerly, facing sand was used on the molding lines for a number of jobs. The saving is facing material cost, mixing and distributing is not reflected in the foregoing figures. This saving would reduce the $350 additional cost of the sand. The figures cited include the cost of the initial sand coating. The sand has not been used long enough to forecast its life, but there is every indication that it should be indefinite.

Experience with the chemically treated sand in the trial production run, to date, has indicated that further improvements can be made. Experimental work will unquestionably show trends toward refinements of a foundry molding sand which we believe has great possibilities now and even greater possibilities in the future. The company has benefited in many ways from this work, and hopes that it has been able to contribute something of value to the foundry industry by using its facilities to give the process its first practical application in mass-production operations.

NOTE: All references to chemically treated sands and the chemical treatment itself refer to a proprietary product or process known as Westonite, a development of B. M. Weston, Foundry Development Engineers, Inc., Detroit.

GATES AND RISERS

CALCULATION OF SIZES

Nathan Janco
President
Centrifugal Casting Machine Co.
Tulsa, Oklahoma

THE DECISION concerning the size of gate or riser for a casting in most foundries has been and still remains, an art. An oversize riser generally is used, with the result that the metal yields obtained in foundry practice are relatively low.

During the past few years various empirical methods of gating and risering castings have appeared, intended to obtain a higher yield and still produce castings with adequate feed metal, thus producing castings of high quality. A number of means have been proposed for calculating the size of gates or risers. In general, however, these methods either have been too elaborate for general use or have not been tried in practice sufficiently to warrant their widespread use.

A number of years ago the writer adopted a method for calculating the size of gates and risers used in the centrifuge and semi-centrifugal methods of centrifugal casting. Application of this method has proved to be simple and satisfactory, and in a few cases the same general method has been applied to static casting work with equally successful results.

The method involves several preliminary assumptions. In the first place, it is assumed that all metal poured into the mold arrives there at the same temperature and that the temperature of mold surfaces is the same at all points in the mold. This naturally assumes that the mold is all of the same composition—without the use of either external or internal chills.

Uniform Factors Considered

The above conditions are most closely and usually obtained in centrifugal casting where the gate serves as a feeder, as well as in the blind-riser method of static casting, wherein gating is carried into the riser itself. Thus the connection between the riser and the casting serves both as a gate and as the feed passage. In these systems of pouring, the condition that all metal arrive in the mold at the same temperature is more nearly achieved.

The condition actually achieved, however, is that the metal farthest from the gate is lowest in temperature. The temperature rises progressively toward the gate, and the metal in the mold nearest the gate is at the highest temperature. This is an ideal condition for directional solidification.

Where such a temperature gradient exists, it will be found that the actual size of gates and risers, as calculated by the method to be described, will be comparatively small since the method assumes that all

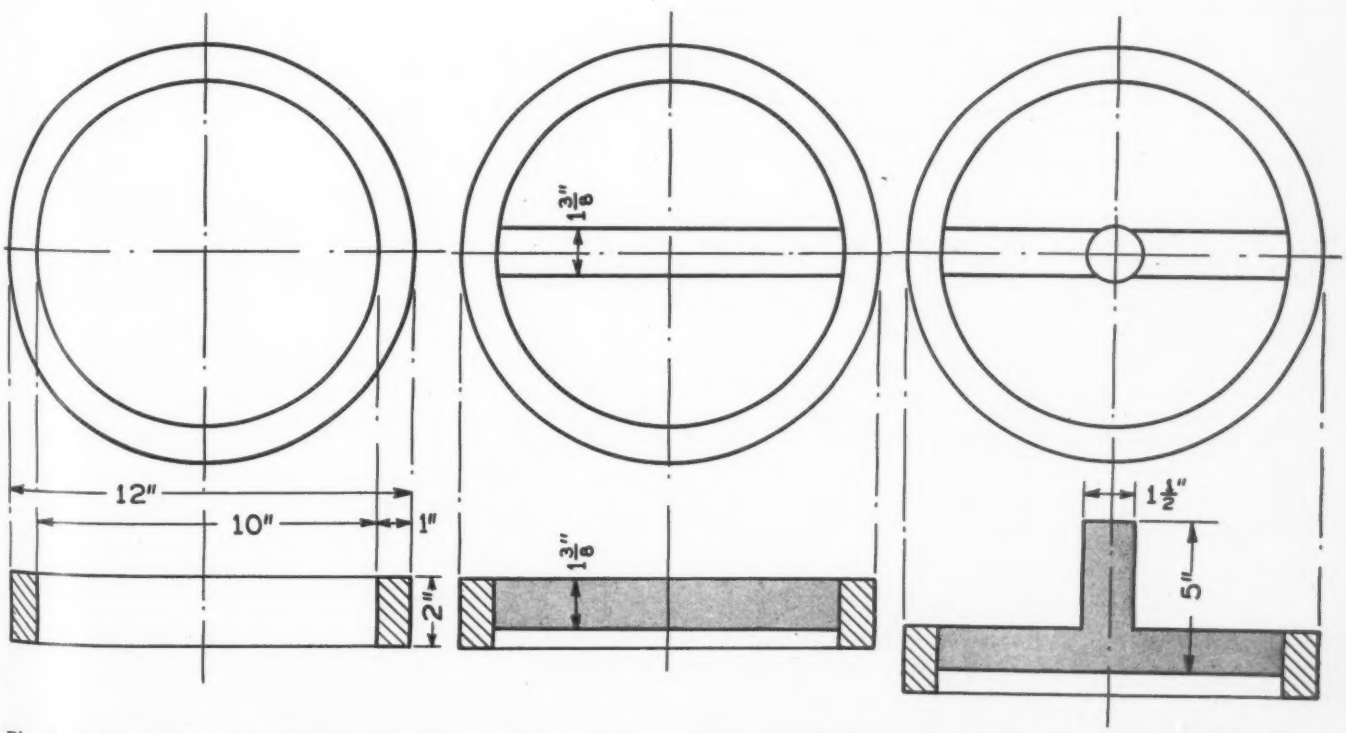


Fig. 1 (left)—Sketch of ring casting having 12-in. O.D., 10-in. I.D., 2 in. high. Fig. 2 (center)—Same ring casting shown in Fig. 1, illustrating position of two gates.

Fig. 3 (right)—Same casting as in Figs. 1 and 2 illustrating downgate determined as required for feeding side gate. Cooling factor is same as for square gate.

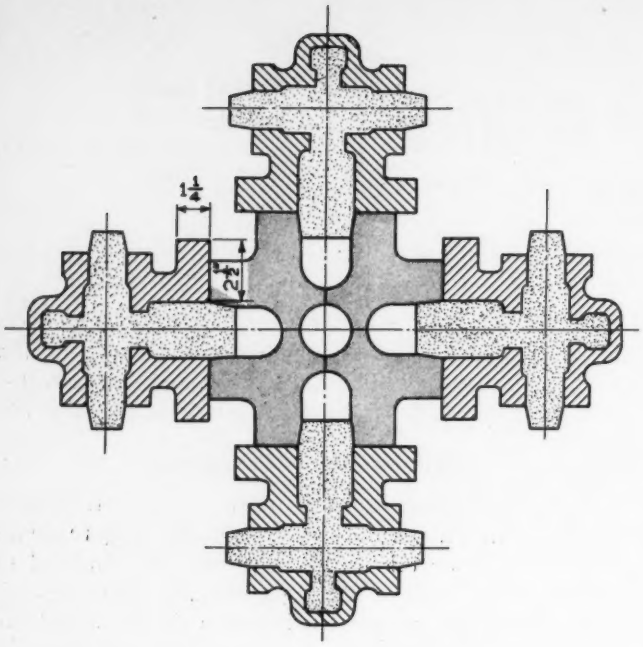


Fig. 4—Cross-section of valve body casting. Size and type of gating required can be calculated from the dimensions of flange and face.

metal arrives in the mold at the same temperature.

In describing this method a term is used which has been called the cooling factor, or C.F. The cooling factor may be calculated:

$$\text{C.F.} = \frac{\text{Volume of casting}}{\text{Surface area of casting subject to cooling}}$$

Thus, by definition, we have a measure of the rate at which the casting will solidify. The greater the cooling factor, the greater the cooling time for the casting. However, most castings do not have uniform wall sections, resulting in a condition whereby the heavier sections of the casting supply feed metal to the thinner sections. Thus, thinner sections are free of shrinkage, whereas the heavy sections and less adequately fed sections may contain shrink cavities.

The problem becomes simpler, inasmuch as it is necessary to feed only the heavier sections of the casting. For this reason risers are used on the heavier sections of castings, since these are the sections requiring feeding from external sources. In consequence, the cooling factor can be more simply defined as:

$$\text{C.F.} = \frac{\text{Area of section of casting}}{\text{Perimeter of section of casting}}$$

For demonstration purposes consider a simple example, such as a ring having 12-in. O.D., 10-in. I.D., 2-in. high, as shown in Fig. 1. The cooling factor of this ring is calculated as follows:

$$\text{C.F.} = \frac{2 \times 1}{1+2+1+2} = 0.333$$

The result is a relative measure of the time required for the casting to lose heat to its surroundings, or how quickly the metal will solidify.

During the period of solidification, the liquid metal inside the casting will decrease in volume and additional metal will be required. For a gate or riser to supply this feed metal, it is necessary that the gate or riser freeze more slowly than the casting itself. Therefore, the cooling factor of the gate must be larger than the cooling factor of the casting.

Assume for the time being that the castings desired are to be cast centrifugally. This casting would be gated with the gate contact on the inside diameter of the casting. From the definition of cooling factor and from experience, the gate or riser which will cool most slowly has a circular cross-section. However, since it is not always practicable in molding to use a gate of circular cross-section, the gate used is generally of a square and sometimes a rectangular cross-section. In this case it will be assumed that a gate of square cross-section will be used because, as will be shown later, a square has the highest cooling factor of all rectangular sections. Thus, if a is called the length of the side of the square, the cooling factor of the square will be as follows:

$$\text{C.F.} = \frac{a^2}{4a} = \frac{a}{4}$$

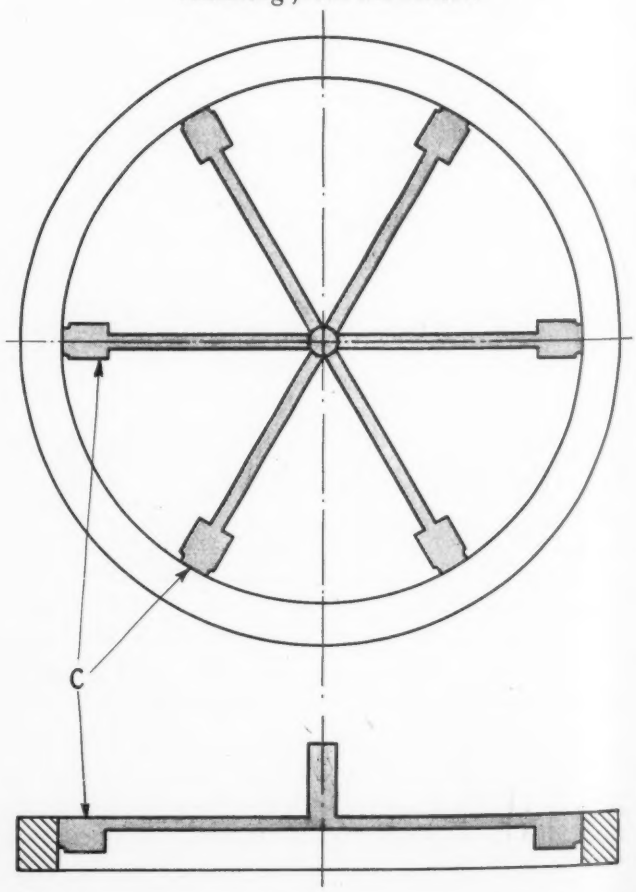
The minimum cooling factor for the gate is the same as the cooling factor for the casting. Therefore,

$$\text{C.F.} = 0.333 = \frac{a}{4} \quad \text{and,}$$

$$a = 0.333 \times 4 = 1.33$$

Accordingly, the minimum length of a is 1.33 in. To be on the safe side, the next larger even dimension, such as 1⅜ in. (1.375), would be used.

Fig. 5—For large castings, as in the wheel casting shown, it may prove advisable to provide the feed metal (C) in the gate itself, with small gates or runners radiating from the center.



It is evident from this equation that the cooling factor of the gate is larger than the cooling factor of the casting itself. The cooling factor of the 1⅜ in. square gate is calculated as follows:

$$\text{C.F.} = \frac{1.375}{4} = 0.344$$

Thus 0.344 is the exact size of gate required to feed this casting. It should be noted that the size of the gate is determined by the rate at which the gate cools; the gate must freeze later than the casting freezes.

Yardstick for Number of Gates

It has not been possible to find an exact method of calculating the number of gates required for a given casting, but experience indicates the following as a general yardstick:

Diam. of Casting	*No. Gates Required*
Up to 12 in.	2
12 to 18 in.	3
18 to 24 in.	4
24 to 30 in.	5
30 to 40 in.	6

Thus, for the casting under consideration, two gates are required, as shown in Fig. 2.

The actual number of gates required usually will be somewhat less than shown in the above table, since a gate will feed an area approximately nine inches from each side of its junction with the casting. This will be determined to a considerable extent by the exact shape of the casting—that is, whether square or rectangular. Other factors are section size and amount of metal in casting . . . whether the castings are large and heavy or small and light.

The experimental casting described above requires a downgate to feed the side gate decided on, as shown in Fig. 3. Naturally, a round downgate is used and the calculation is as follows:

$$\text{C.F.} = \frac{\pi\ D^2}{4\pi\ D} = \frac{D}{4}$$

This results in the same cooling factor obtained for the square gate. Thus, the downgate must have a larger diameter than 1⅜ in., and a diameter of 1½ in. would be selected.

Metal in Gates Must Be Adequate

It is entirely possible that the size of the gate and downgate have been properly selected to freeze later than the casting but may be so small as not to contain an amount of metal adequate to feed the casting.

The shrink rule allowance used in the production of patterns represents the amount of contraction that takes place in a casting during the time the solidified casting cools to room temperature. However, the metal also decreases in volume during the process of solidification. It is this shrinkage or decrease in volume that makes necessary risers or feeders to supply the casting with additional molten metal during the solidification period. The amount of solidification shrinkage is comparatively small for certain types of cast iron and brass, higher for steel, and still greater for magnesium.

The height of the downgate must be adequate to supply the amount of feed metal required for both the casting and the in-gates.

If this casting were steel, it would weigh approxi-

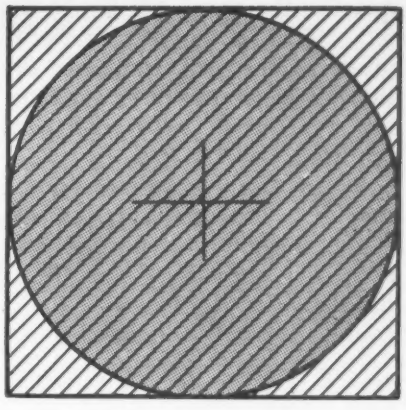


Fig. 6—Amount of metal necessary to feed a circular riser or feeder is the same as for a square feeder of same diameter. Cooling factors are also same. Thus the circular gate is to be preferred, since metal in corners of the square serves no useful purpose.

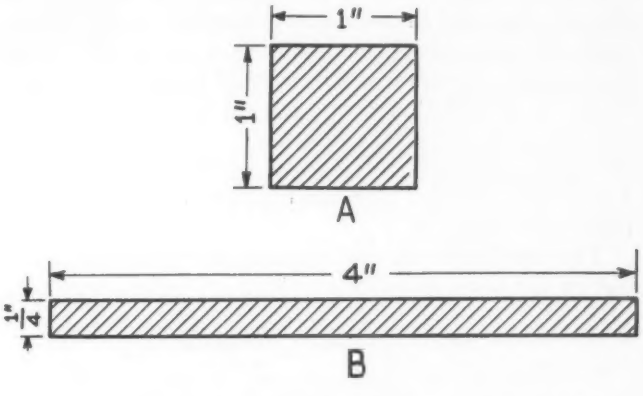


Fig. 7—Illustrating a method of determining the size of adequate gates and risers, based on relative area of the gate and the casting, which the author believes fallacious since the cooling factors vary considerably.

mately 20 lb. The volumetric shrinkage of steel is approximately 3½ per cent; but to be safe, and because many castings have irregular contours which make exact calculation impracticable, a figure of 10 per cent is used. The total weight of the side gates used in this case is 4½ lb. Thus a total of 24½ lb. requires feeding. Ten per cent of this is approximately 2½ lb., the amount of metal required in the downgate. Since each inch of the 1½ in. diameter downgate weighs ½ lb., a downgate 5 in. high would be required.

The size of the gates which contact and actually feed the casting, and the diameter and height of the downgate necessary to feed an adequate amount of metal to the in-gates and casting, have now been calculated.

In many cases the diameter of the downgate will be a figure inconvenient to use in foundry practice. For example, instead of a 1½ in. diameter downgate, a 2 in. diameter downgate could be used. However, in this case it would not be necessary to use so tall a downgate, since the 2-in. downgate need only be 2.8 in. or 3 in. tall. A larger gate may always be used, because its cooling factor will be larger and thus it will solidify later.

Calculating a Complex Casting

As another example of a somewhat more complicated casting, consider a valve body. Here the heaviest section is the flange; if the flange can be fed ade-

quately, the remainder of the valve body will be perfect. This assumes that the valve body has been properly designed from the foundry standpoint, so that directional solidification can ensue when the casting is poured; otherwise pads or chills may be required.

Figure 4 shows the cross-section of such a valve casting. It is necessary merely to measure the dimensions of the flange in order to determine the size and type of gating necessary. Assuming that the thickness of the flange is 1¼ in., with the face 2½ in. wide, the cooling factor is calculated thus:

$$\text{C.F.} = \frac{1.25 \times 2.5}{2.5 + 1.25 + 2.5 + 1.25} = 0.416$$

To be exact, it would be necessary to subtract the area of that part of the casting attached to the flange, from the amount of cooling surface which the flange encounters. However, if this step is neglected, a safety factor is provided for the size of the gate obtained and the calculation is simplified. Thus, the size of the gate required, calculating as before, would be: $4 \times 0.416 = 1.656$. The next larger convenient fractional size is 1¾ in.

The remainder of the calculations would be carried out in the same manner.

Metal Economy Considered

It is not always necessary nor economical to have the downgate equal to the calculated diameter and height to feed the castings as well as the gates. For large castings, it may be advisable to provide the necessary amount of feed metal (*C*, in Fig. 5) in the gate itself, and to use small gates or runners coming back to the center. This is a matter of economy of metal. Generally, it is possible to obtain yields of more than 75 per cent using these methods.

It is interesting to note that the amount of feeding provided by a circular riser or feeder is exactly the same as that of the smallest size square riser in which it could be placed, as shown in Fig. 6.

$$\text{C.F. for circular gate} = \frac{\text{Area}}{\text{Perimeter}} = \frac{D^2\pi}{4\pi D} = \frac{D}{4}$$

$$\text{C.F. for square gate} = \frac{\text{Area}}{\text{Perimeter}} = \frac{a^2}{4a} = \frac{a}{4}$$

Where D = the diameter of the circle and
a = the side of the square.

For a circle of diameter D and a square of side D, the cooling factors are the same. Thus, the amount of metal in the corners is wasted.

Adequate Feeding

Various methods have been suggested for determining the size of gates or risers necessary to feed a casting, based on the relative area of the gate with relation to the area of the casting. The writer believes this a fallacy, as shown in Fig. 7. This illustrates two sections, one of which (*A*) is a 1-in. square, while the other (*B*) has exactly the same area but is ¼ in. thick and 4 in. long. From practical experience, foundrymen know that the casting or gate with the ¼-in. thickness will freeze more quickly than the 1-in. square gate. This is clearly shown by the fact that the cooling factor for the square gate is 0.25, whereas the cooling factor for the ¼ in. gate is only 0.1118.

FOREIGN FOUNDRYMEN ATTEND 51ST ANNUAL A. F. A. MEETING

THAT THE IMPORTANCE of the Annual Convention A.F.A. is constantly growing abroad was evidenced by the number of foreign foundrymen attending the Detroit Convention from all over the world. All of them attended many of the technical sessions and plant inspection trips and since the meeting are continuing their visits to plants throughout the country.

Of special interest to these foundrymen were the publications describing the great advancements made in foundry technology, methods and equipment during the war years. In many countries the distribution of technical literature was greatly curtailed during the war period and is just now becoming generally available.

Sixteen visitors from 9 foreign countries registered in the special "guest book" for foundrymen from abroad. Among those who attended the Convention from foreign lands were the following:

Australia
E. L. Lewis, Kelley & Lewis, Melbourne.

Belgium
Pol Boel, Usine G. Boel, La Louvare.

Brazil
Oscar Margolia Vel Gordon, Compania de Ferro, Maleavel, Rio de Janiero.

Czechoslovakia
J. Koritta, Czechomoravian-Kolben, Praha.
O. Starosta, Zbrojovka Brno Jawa-Fdry, Tynec nad Starosta.

India
S. N. Iyengar, Premier Automobile, Ltd., Bombay.
J. V. Patel, New Std. Eng. Corp., Bombay.

Norway
John Gahr, Taheel & Kuerne, Oslo.
Anne-Munthe Langrum, A/S Drammens Fern, Drammen.
Bjorn Laughlin, A/S Drammens Fern, Drammen.

South Africa
C. Ferguson, Durban Falkirk Iron Co., Durban.

Sweden
Harold Gustafsson, Wedaverken, Sodertalje.
H. Rudberg, Iron Refining Co., Haellefenshaes.
C. G. Sporron, Iron Refining Co., Haellefenshaes
Karl G. Westin, Westin-Backland, Stockholm.

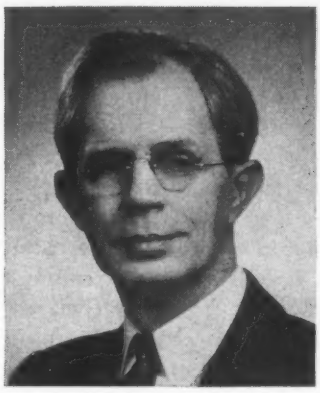
Switzerland
Armin Sonderegger, The George Fischer Steel & Iron Works, Ltd., Schaffhausen.

Can You Help?

A.F.A. is anxious to obtain some copies of A.F.A. TRANSACTIONS, Volume 52 (1944) from members who may have no use for copies in their files. The supply of this volume is entirely exhausted and a number of important requests have been received for this edition.

For intact copies in good condition A.F.A. will be glad to make arrangements for purchase. If you have a copy of Volume 52 which you do not need, please forward promptly to: The Secretary, American Foundrymen's Ass'n, 222 West Adams Street, Chicago 6, Ill.

MEXICAN FOUNDRIES



Ralph L. Lee
General Motors Corp.
Detroit

I HEADED for an A.F.A. sponsored visit to Mexican foundries with ideas that had to be chucked overboard as soon as I got down there.

After visiting seven foundries in Mexico City, ranging in size from a little eight man and boy soil pipe foundry to a large modern steel foundry, my preconceived ideas of Mexicans and Mexican industry had to be scrapped.

I don't believe I have seen any better work tempo in the States. I saw fewer "sour pusses" and every evidence that a mutual respect and confidence did exist between workman and boss, an employe relationship we would do well to copy.

I can now understand why the (so-called) Spanish conquerors of Mexico were dumbfounded to find such wonderful examples of metal work, pottery, weaving and other highly skilled crafts. In every foundry I visited I noticed a high degree of skill and the work interest which usually goes hand in hand with such skill. So from the standpoint of the individual foundrymen and the relationship between them, I came away from Mexico with the conviction that we in the States have much to learn from our Mexican neighbors about labor relations.

With only a week to spend, Mr. Covacevich, secretary of Mexico City Chapter of A.F.A., went clear out of his way to show me a cross section of the foundry industry down there.

Adapting Equipment

I shall never forget the little soil pipe and fitting foundry. The cupola lined to about 18 in., which meant, of course, that only a narrow-shouldered boy could possibly do the patching. I saw eye to eye with that boy through an exceptionally large tap hole. An antiquated eight-cylinder engine drove the blower through quite a setup of flat belts, pulleys and countershafts.

While the scheme may be as old as the hills, I had never seen what to me looked like a gravity sandslinger they were using to make cores for the pipe. Lengths of iron pipe were used as mandrils, first wet with gooey clay and slowly turned by hand while sand fell on them through a wide, shallow chute from the floor above. A sweep scraped off the excess to size and shape the core. Flasks were handmade and the patterns looked as though they had been through quite a lot, but the castings were good and if they had much scrap they must have hidden it before we got there.

Intricate Castings Made

The thing that got me was the quantity of work they were turning out with so few tools, men and such little capital. I met everybody in the place including several apprentices who couldn't have been over 14 years old. They seemed to get a bang out of having visitors.

Another little gray iron foundry was turning out intricate castings with complicated cores on a small quantity job shop basis, but the castings were good with finishes and grain any one could be proud of. Again a tiny cupola, but with a little elevator for loading, operated by a small electric hoist. It looked to me as though they also used the hoist for general utility purposes when the cupola wasn't operating.

I don't know why they did it but they made many of their castings in pits, which I am sure we would have made in flasks in this country.

Speaking of flasks, the owner was quite proud of one type he said he had invented, and in my opinion he had a right to be. He had taken standard light-gauge channel (formed sheet steel) with narrow flanges, and mortise welded the channels together with the flanges on the inside. Simple guide pins and lifting handles were added. Instead of using weights or clamps they bent soft iron strips around the handles to hold the cope and the drag together. I'm going to make some of these flasks.

Again I noticed that everybody kept busy without prodding as though they enjoyed their work. Even though my Spanish was limited, the boss was pleased when I told him how much I had learned from my visit with him and his boys. At the Chapter meeting he and I were pals.

Laboratories Well Equipped

The two smaller foundries were not typical of the other five, as far as equipment is concerned. Every one of the other five had excellent equipment, bang-up, fully equipped laboratories manned by enthusiastic young technicians. Believe me, those folks down there mean business, and in my opinion they are going places.

I feel quite sure that any of our quantity production experts would be in for a bad case of frustration in most of the foundries down there. They pour practically everything that can be poured, regardless of quantity. In one foundry, for instance, they made gray iron of almost every type, and malleable, steel, bronze, brass and aluminum. While I couldn't help but think they might do much better to specialize, I learned that foundries are so few, their manufacturing customers so few and operating on such a relatively small scale, they must spread themselves pretty thin.

A brand new steel foundry, when finally in operation, will be as well equipped as any I have seen in the States. The owner is also proprietor of one of the largest mallea-

ble and gray iron foundries. While he could speak but little English and I little Spanish, we both had a wonderful time without an interpreter, going through both plants.

It is a crime to try to describe what Mexican foundries are doing on the basis of the short time I was there, to say nothing of my limited knowledge of the business. But I am sure of this—that Mexicans have determined to industrialize, as a necessary means of putting themselves on a sounder economic basis. They appreciate the extent to which industry depends upon the foundry.

Capital seems to be available, and their determination to master the technical side of cast metal practice is very much in evidence. I personally believe that through their new Mexico City chapter of A.F.A. we should be able to help them do the job they have undertaken.

PLANS PREPARED FOR ANNUAL CHAPTER CHAIRMAN MEETING

THE FOURTH Annual Chapter Chairman Conference is scheduled to be held in Chicago June 30, July 1-2 at the Palmer House. This will be the first three day meeting of incoming A.F.A. chapter chairmen, other chapter chairman conferences being one or two days in length. It is felt that conducted on a three day basis it will allow maximum time for chapter representatives to discuss mutual problems.

Concise Program

Designed to materially increase the strength and prestige of the chapters as well as to designate the role of A.F.A. as a national technical society of the foundry industry, the program to be offered is concise, limited in scope and within the ability of every chapter to carry out wholeheartedly.

The program planned is for the national coordination of chapter activities and being prepared by the National Office at the request of the chapters and will be presented to the delegates in outline form. It is expected that a great deal of discussion will be forthcoming, and useful suggestions and criticisms made by the chapter delegates. Also scheduled for the conference are sessions through which delegates will acquire familiarity with all phases of A.F.A. national activities and understanding of the many ways in which the national officers offer assistance to chapter officers and chapter meetings.

Chapter Functions

Among the important topics to be discussed will be the formation of educational committees by all chapters and means by which chapters can further foundry education; regional meetings and their possibilities; preparing chapter programs in advance and the functions of program committees; and extra curricular activities such as national officers night, ladies night, lecture courses and other special events.

As this attendance will be representative of 38 A.F.A. chapters, chairmen from the Atlantic and Pacific coasts and extending from border to border—including Mexico and Canada—will be present. On hand to greet them will be A.F.A. National President S. V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis; A.F.A. National President-Elect Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.; A.F.A. National Vice-President-Elect and Chairman of the Conference W. B. Wallis, Pittsburgh Lectromelt Furnace Co., Pittsburgh, as well as other national directors and members of the National Office Staff.

Further announcements concerning the chapter chairman conference will be sent to all chairmen from the National Office within a short time.

Top left—Seated left to right at the speakers table Brass and Bronze Round Table Luncheon R. J. Keeley, Ajax Metal Co., Philadelphia; H. Smith, Federated Metals Div., American Smelting & Refining Co., Pittsburgh, Pa.; and B. A. Miller, Baldwin Locomotive Works, Philadelphia. Top right—Roving cameraman catches (left to right) G. P. Halliwell, H. Kramer & Co., Chicago; N. A. Kahn and B. N. Ames, New York Naval Shipyard, New York; and B. M. Loring, Naval Research Laboratory, Washington, D. C. Bottom left—At the Annual Business Meeting A.F.A. President S. V. Wood hands checks and award certificates to apprentice winners. Bottom right—Aluminum and Magnesium Round Table Luncheon officials were: (standing, left to right) A. T. Ruppe, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.; Hiram Brown, Solar Aircraft Corp., Des Moines, Iowa; and R. E. Ward, Eclipse Pioneer Div., Bendix Aviation Corp.; and (seated, left to right) Walter Bonsack, National Smelting Co., Cleveland; C. E. Nelson, Dow Chemical Co., Midland, Mich.; and W. T. Bean, Jr., Continental Aviation & Engineering, Detroit.

FOUNDRY PERSONALITIES

W. Z. Friend, associated with the development and research division of International Nickel Co., New York, since 1937, was named assistant section head of its corrosion engineering section recently.

L. W. Slack, vice-president and general sales manager of Packard Motor Car Co., Detroit, was recently elected to the board of directors. He fills the vacancy created by the resignation of **Joseph Dodge,** appointed Special Minister to Austria by Secretary of State George Marshall.

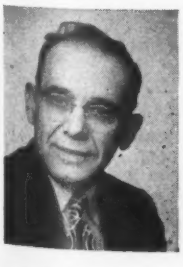
The Quarter Century Club of Grede Foundries Inc., Milwaukee, announced the election of **Max Plehn** as president. He is foreman, Spring City Div., Waukesha, Wis. **Harry Strzyzewski,** of the Milwaukee Steel Div., has been elected vice-president. **Michael Mayer,** of the Liberty Div., Milwaukee, is to serve as secretary-treasurer. Re-elected as directors, and senior members of the club, were **Joseph Krenn** and **William J. Grede,** president, Grede Foundries Inc.

F. Cousans, since 1944 works manager, Catton & Co., Ltd., Leeds, England, has joined the staff of Hadfields, Ltd., Sheffield. He is the author of the 1947 IBF exchange paper which was to be presented at the 51st annual convention of A.F.A. in Detroit. Prior to his association with the Catton firm, Mr. Cousans was works manager, Thos. Firth & John Brown, Ltd., Scunthorpe, for twenty years.

Clay Stephenson has been appointed foundry superintendent, Cooper Alloy Foundry Co., Hillside, N.J. Prior to joining the Cooper firm, he was with Unitcast Corp., Toledo, Ohio. An active A.F.A. member, Mr. Stephenson has been affiliated with Toledo chapter.

H. C. Guterman, who has been senior vice-president and general manager, Arma Corp., Brooklyn, since last September, was elected president at the annual meeting of stockholders. He succeeds A. P. Davis one of the founders of the firm, who continues his association as a director and engineering consultant. The company returns to private industrial work following 25 years service to the Navy.

Clay Stephenson **H. C. Guterman**



W. Z. Friend **D. H. Lucas**

H. B. Walters, formerly assistant works manager, Allis-Chalmers Mfg. Co., Pittsburgh, is works manager, Boston plant.

W. U. Wirtz has been elected president, Electric Furnace Co., Salem, Ohio, succeeding the late R. F. Benzinger. Formerly executive vice-president, he has been with the firm since 1927, when he joined as an erection engineer.

Anthony Haswell, Dayton Malleable Iron Co., Dayton, Ohio, was elected president of the Foundry Educational Foundation at the first annual meeting. **P. E. Rentschler,** Hamilton Foundry & Machine Co., Hamilton, Ohio was named vice-president; **J. H. Lansing,** Malleable Founders' Society, Cleveland, secretary, and **W. M. Caldwell,** Gray Iron Founders' Society, Cleveland, treasurer.

Trustees include **B. D. Claffey,** General Malleable Corp., Waukesha, Wis.; **R. W. Crannell,** Lehigh Foundries, Inc., Easton, Pa.; **J. M. Price,** Ferro Machine & Foundry Co., Cleveland; **F. G. Sefing,** International Nickel Co., New York; **J. H. Smith,** Central Foundry Div., General Motors Corp., Saginaw, Mich.; **S. C. Wasson,** National Malleable & Steel Castings Co., Cicero, Ill.; **J. T. MacKenzie,** American Cast Iron Pipe Co., Birmingham; **B. L. Simpson,** National Engineering Co., Chicago; **George Hutchins,** Standard Foundry Co., Worcester, Mass., and **O. A. Pfaff,** American Wheelabrator & Equipment Corp., Mishawaka, Ind.

J. F. Considine, formerly assistant district manager, American Car & Foundry Co., Chicago, has been appointed district manager.

E. F. Tibbetts, formerly shipbuilding division assistant materials engineer, Bethlehem Steel Co., Quincy, Mass., has joined Lummus Co., New York, as metallurgical engineer. He holds a personal membership in A.F.A.

G. W. Cannon was elected chairman of the board at a recent meeting of directors of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. He is succeeded as president by **I. A. Wyant,** formerly executive vice-president. **C. L. Beatty** was elected a vice president.

D. H. Lucas, manufacturers' representative, Chicago, has been appointed exclusive agent in Illinois, Indiana and Wisconsin for J. Thos. Rhamstine, Harlingen, Texas. An active member of A.F.A., Mr. Lucas is a director of Chicago chapter and chairman of its membership committee.

H. B. Myers, who recently received his discharge from the Army, has been appointed a Fellow on the Abrasives Fellowship sustained at Mellon Institute of Industrial Research by the Carborundum Co. Prior to his military service, Mr. Myers was metallurgist for McConway & Torley Corp. at Pittsburgh.

H. J. Anderson and **G. F. Neely** were recently appointed sales engineers, Vulcan Mold & Iron Co., Latrobe, Pa. Chief engineer and mold designer prior to his new appointment, Mr. Anderson has been with the firm for more than 12 years. Mr. Neely comes to the organization from American Rolling Machine Co., Butler, Pa., with which firm he had been associated, except for a period of three years in the Navy, since 1936.

D. R. Cline has been appointed to the Chicago district sales and service staff of Vascoloy-Ramet Corp., North Chicago, Ill. Other new appointments are: **J. M. Kinney,** Toledo, Ohio; **B. J. Naden,** Cleveland; **Frank Scheffler,** Kansas City

Kempton Dunn was elected secretary, American Brake Shoe Co., at a recent meeting of the board. He has been treasurer of the firm since 1942, and assistant secretary since 1946. **C. E. Brush** was elected an assistant secretary. **S. T. McCall,** vice-president and secretary of American Brake Shoe, retired from active service June 1. He had been associated with the organization since 1910. The company has also announced the appointment of **Homer Parsons** as director of exports. Assistant director for the past six months, Mr. Parsons joined American Brake Shoe in 1945. He has a background of 19 years in the export field.

Mr. Dunn is a native of Philadelphia and attended Kent School and Yale University. Mr. Brush is a Cornell graduate.

(Continued on Page 88)

Kempton Dunn **C. E. Brush**

SEASON'S FINAL AT QUAD CITY FEATURES DOUBLE PROGRAM

QUAD CITY CHAPTER of A.F.A. staged a double-feature on May 19, with a special luncheon for top foundry management of the area, coupled with a National Officers Night at which National President S. V. Wood and Secretary-Treasurer Wm. W. Maloney were special guests. The noon event was held at the Blackhawk Hotel, Davenport, and the evening meeting at the Ft. Armstrong Hotel, Rock Island.

Chapter Vice-Chairman R. H. Swartz, Riverside Foundry Co., Davenport, presided at the luncheon for management, attended by the largest and most representative group of foundry officials ever to turn out for a local meeting in the Quad Cities. Nearly 40 responded to the invitation to hear President Wood, who urged management to play a more active part in the Chapter's activities, devoted to the interests of the castings trade in every phase of operations.

"The answer to much of our problem of getting more young men into the foundries," he said, "lies largely in the degree of enthusiasm that top management is able to create. Herein also lies the solution to building a better trained, more loyal and more capable staff of men who must produce your castings.

Old Industry

"This industry of ours," he added, "is the oldest and most vital of all the metalworking trades, yet is the least known, least understood and least publicized of all basic industries. A.F.A. nationally, and your local A.F.A. Chapter, are endeavoring aggressively to correct this situation, an effort which merits the support of every foundry executive."

Chapter Chairman C. S. Humphrey, C. S. Humphrey Co., Moline, Ill., also introduced the principal of the Moline High School, Lloyd W. Ashby, who spoke briefly on the desire of the educational authorities to cooperate with the foundries in the teaching of subjects most related to the castings field. Mr. Ashby offered the complete cooperation of the local schools in any sound program developed by the chapter, and Chairman Humphrey described the active work of the Chapter educational committee.

Among those attending the luncheon were the following, in addition to Chairman Humphrey, Vice-Chairman Swartz, President Wood and the National Secretary:

R. L. Van Alstyne, Fairbanks Morse & Co., E. Moline; H. Bornstein, Deere & Co., Moline, past-President of A.F.A.; Col. C. A. Waldmann, Commandant, Rock Island Arsenal, Rock Island; R. E. Hinds, Riverside Foundry Co., Bettendorf; John A. Atkins, Foundry Industries, Inc.; H. A. Torgersen, International Harvester Co., Rock Island; John H. Diedrich, Blackhawk Foundry & Machine Co., Davenport; Guy E. Sharpe and H. R. Lafferty, Red Jacket Mfg. Co., Davenport.

Harold A. Rasmussen, Ferro Bronze Corp., Moline; Chapter Secretary-Treasurer C. R. Marthens, C. R. Marthens Co., Moline; A. E. Hageboeck, T. J. Frank and W. J. O'Malley, Frank Foundries Corp., Moline; G. B. Withington and Stanley Olson, J. I. Case Co., Rock Island; Bryan W. Grafton, Rock Island Metal Foundry, Rock Island; Chas. F. Scherer and T. F. Bailey, Davenport Machine & Foundry Co., Davenport; C. D. Raisbeck and C. W. Carlson, John Deere Spreader Works, E. Moline; W. E. Jones, Federal Foundry Supply Co., Moline.

B. V. Nutt, Moline Iron Works, Moline; A. H. Putnam, A. H. Putnam Co., Rock Island; C. H. White, Deere & Mansur Works, Moline; Frank Dickey and Geo. T. French, Union Malleable Iron Works, E. Moline; Milo Dockterman and J. A. Huelsen, Mississippi Foundry Corp., Rock Island; G. R. Englin, Carver Pump Co., Muscatine; A. D. Matheson, H. S. Lord and L. P. Smith, French & Hecht Co., Davenport; T. W. Alder, Blake Mfg. Co., Rock Island; Geo. H. Essex, Iowa Malleable Iron Co., Fairfield.

Following a meeting with the

(*Concluded on Page 87*)

On May 19 the Quad City chapter held a special management luncheon and in the evening their regular chapter meeting at which time they honored A.F.A. National Officers. Playing a major role in the day's double feature program were (left to right) W. W. Maloney, A.F.A. secretary-treasurer, Chicago; A.F.A. National President S. V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis; and Chapter Vice-Chairman R. H. Swartz, Riverside Foundry Co., Davenport, Iowa.

★ NEW A. F. A. MEMBERS ★

April 15 to March 13—Thirty-one chapters report an increase in membership according to this membership list. With the 51st Annual A.F.A. Convention held in Detroit the host chapter reports an addition of 28 members including one company membership. The Tri-State chapter continues its upward surge by collecting 15 new members, 2 of which are company memberships. All in all a total of 154 members are listed in this report which in itself is gratifying as it shows the deep interest of foundrymen throughout the world for more technical knowledge in all subjects and divisions of the castings industry. Watch this list to see if your chapter appears.

BIRMINGHAM DISTRICT CHAPTER

***Mountain City Foundry & Machine Co., Greenville, S.C. (John Hunt, President.)**
Wilburn Asbury, Production, Mountain City Foundry & Machine Co., Greenville, S.C.
C. L. Horton, Foreman, Mountain City Foundry & Machine Co., Greenville, S.C.
H. V. Johnson, Sales Manager, Black Diamond Coal Mining Co., Birmingham, Ala.
F. L. Pearson, Mountain City Foundry & Machine Co., Greenville, S.C.
D. S. Porter, Draftsman, Mountain City Foundry & Machine Co., Greenville, S.C.
E. M. Turner, W. J. Bullock Inc., Birmingham, Ala.

BRITISH COLUMBIA CHAPTER

***Progressive Engineering Works Ltd., Vancouver, B.C., Canada. (R. C. Samson, Production Manager.)**
W. G. Patterson, Fdry. Frm., Progressive Engineering Works Ltd., Vancouver, B.C., Canada.

CANTON DISTRICT CHAPTER

Charles H. Shelton, Pres., The Industrial Metallurgy Institute, Inc., Canton.
Gordon A. Stumpf, Met. Engr., (Steel & Tube Div. Library) Timken Roller Bearing Co., Canton.

CENTRAL ILLINOIS CHAPTER

Frank Haye, Sr., Partner-Manager, Capitol City Pattern Works, Springfield.

CENTRAL INDIANA CHAPTER

***Danville Plant, Central Foundry Div., General Motors Corp., Danville, Ill. (E. E. Braun, Plant Manager.)**
***Spickelmier Co., Indianapolis. (L. S. Abbett, General Manager.)**
R. J. Frazee, Mgr. Refractory Div., Spickelmier Co., Indianapolis.
Leslie D. Kirkman, Fdry. Supt., Harrison Steel Castings Co., Attica.
B. H. Moore, District Sales Manager, A. P. Green Fire Brick Co., Indianapolis.
A. F. Randolph, Ass't. Supt.-Cleaning Room, Harrison Steel Castings Co., Attica.

CENTRAL MICHIGAN CHAPTER

***Reed Foundry & Machine Co., Kalamazoo. (Ralph M. Fisher, Pres.)**
William E. Fisher, General Manager, Reed Foundry & Machine Co., Kalamazoo.
J. F. Hansen, Sec'y-Treas., Reed Foundry & Machine Co., Kalamazoo.
C. J. Lofgren, Manager, Battle Creek Foundry Co., Battle Creek.
Walter B. Miller, Supt., Battle Creek Foundry Co., Battle Creek.
Ilo H. Wilson, Pattern Maintenance Supt., Albion Malleable Iron Co., Albion.
Robert M. Woodward, Prod. Manager, Reed Foundry & Machine Co., Kalamazoo.

CENTRAL NEW YORK CHAPTER

***Rome Smelting & Refining Corp., Rome. (Don Getz, President.)**
John P. O'Leary, Sales Repr., Ingersoll-Rand Co., New York.
E. H. Schlinck, Sand Control Engr., Oberdorfer Foundry, Syracuse.
Ben F. Sweet, Manager Foundry Div., Noble & Wood Machine Co., Hoosick Falls.

CENTRAL OHIO CHAPTER

Paul H. Scherf, Asst. to Pres., Alten's Foundry & Machine Works, Lancaster.

CHESAPEAKE CHAPTER

A. G. Ealy, Mgr., Non-Ferrous Foundry, Littlestown Hardware & Foundry Co., Inc., Littlestown, Pa.
L. Earl Gaffney, V.-P., Arlington Bronze & Aluminum Corp., Baltimore, Md.
N. C. Hamilton, Quarterman, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

CHICAGO CHAPTER

Berger Anderson, Pattern Dept., Howard Foundry Co., Chicago.
Eugene Conreaus, Beardsley & Piper Co., Chicago.
Joseph R. Crawford, Engineer, Greenlee Foundry Co., Chicago.
Frank H. Ellenbaum, Salesman, Foundry Supplies Co., Chicago.
Earl R. Pierce, Service Engineer, Pittsburgh Metals Purifying Corp., Pittsburgh.
E. H. Roeming, Pyott Foundry & Machine Co., Chicago.
Theodore J. Skill, Time Study Engr., Pettibone Mulliken Corp., Chicago.
Eugene Sommer, Foreman, Continental Foundry & Machine Co., East Chicago, Ind.
John D. Wozny, Research Met., American Steel Foundries, East Chicago, Ind.

CINCINNATI DISTRICT CHAPTER

***The Treaty Co., Greenville, Ohio. (S. E. Breaden, President.)**
Robert I. Boyd, Foundry Manager, The Treaty Co., Greenville.
Jay R. Burns, Met., Wright Field, Dayton.
Carl Cook, Repr., The Kindt Collins Co., Cleveland.
Thomas E. Kramer, Chemist, Acme Aluminum Alloys Inc., Dayton.
Frank J. Lewis, Fore., Chris Erhart Foundry & Machine Co., Cincinnati.
John C. Maloney, Student, The Chris Erhart Foundry & Machine Co., Cincinnati.
William J. Martin, Jr., Sls., Peninsular Grinding Wheel Co., Cincinnati.
Otis L. Purtee, Gettysburg, Ohio.
Thomas W. Wall, Supt. Pattern Div., Acme Aluminum Alloys Inc., Dayton.

* Company Member.

DETROIT CHAPTER

***Kaiser-Frazer Corp., Detroit Engine Div., Detroit. (W. A. Cannon, Pro. Dir.)**
A. A. Andrews, Fdry. Master Mechanic, Pontiac Motor Car Div., General Motor Corp., Pontiac, Mich.
Theodore E. Beauregard, Conference Leader, Ford Motor Co., Dearborn, Mich.
James H. Bothwell, Supt., Detroit Brass & Malleable Works, Wyandottee, Mich.
Lawrence P. Breitenbach, Jr., Chemist, Packard Motor Car Co., Detroit.
Joseph J. Collins, Molding Fore., Pontiac Motor Car Div., General Motors Corp., Pontiac.
Byrl W. Deuel, Head Appr. Teacher, Pattern Mkg., Building Trade School, Detroit.
Chas. B. Ford, Insp. Fore., Cadillac Motor Car Div., General Motors Corp., Detroit.
Maurice F. Garwood, Chief Met., Chrysler Corp., Detroit.
D. W. Hallstein, Sales Engineer, Ingersoll-Rand Co., Detroit.
Louverne Irwin, Foreman, Detroit Steel Castings Co., Detroit.
Walter E. Jominy, Staff Engineer, Chrysler Corp., Detroit.
Casimir T. Koziara, Met. Eng., Ford Motor Co., Dearborn.
Richard F. Lang, Owner, Richard F. Lang, Detroit.
Harry B. Leinbach, District Mgr., Mullite Refractories Co., Shelton, Conn.
Hugh Martin, Jr., Detroit Gray Iron Foundry Co., Detroit.
Nathan J. McAlone, Instr. Patternmaking, Building Trade School, Detroit.
John Nabrezny, Chief Insp., Michigan Malleable Iron Co., Detroit.
Paul K. Nichols, Mgr., Conover Engineering Co., Detroit.
Frank J. O'Brien, Foreman (Mldg.,) Pontiac Motor Car Div., General Motors Corp., Pontiac, Mich.
Edward C. Pierce, Supvr. Mfg. Trng., Ford Motor Co., Dearborn, Mich.
J. Norman Pohl, Supr. Property Acctg., Mich. Smelting & Ref. Co., Detroit.
M. J. Schneider, Detroit Gray Iron Fdry. Co., Detroit.
J. R. Scott, Sls. Rep., Kendallville Fdry., Inc., Kendallville, Ind.
L. F. Stanke, Purch. Agent, Detroit Engine Div., Kaiser-Frazer Corp., Detroit.
Charles T. Walker, Owner, Univertical Machine Co., Royal Oak, Mich.
John J. Watson, Detroit Repr., C. O. Bartlett & Snow Co., Detroit.
Charles R. Westfall, Stud., Pontiac Motor Div., General Motors Corp., Pontiac, Mich.

METROPOLITAN CHAPTER

Roger S. Babcock, Lab. Div. Head, The Linde Air Products Co., Newark. N.J.
James S. Campbell, Jr., Instr., Mech. Engrg. (Fdry.) Rensselaer Polytechnic Institute, Troy, N.Y.
James F. Foran, Fdry. Engr., Foran Fdry. & Mfg. Co., Flemington, N. J.
Edward F. Kurzinski, Dev. Engr., The Linde Air Products Co., Newark, N.J.
Keith D. Millis, Res. Met., International Nickel Co., Bayonne, N.J.
Frank B. Mundy, Partner, R. & M. Pattern Works, Springfield, N.J.
Perrin F. Shaw, Jr., Asst. Met., Alpine Trading Co., New York.

MEXICO CITY CHAPTER

Antonio A. Pizzuto, Pres. & Mgr., Fundicion Pizzuto S.A. San Luis Potosi.
Jose G. Udaeta, Supt., Industria Electrica de Mexico S.A., Mexico City.

MICHIANA CHAPTER

John E. Courtney, Student, University of Notre Dame, Notre Dame, Ind.
Guy R. Hamilton, Gen. Mgr., Lakeside Foundry, Warsaw, Ind.
Ronald G. Kaufman, Asst. Frm., Lakeside Foundry, Warsaw, Ind.
Willard Ross Neely, Asst. Frm., Lakeside Foundry, Warsaw, Ind.

NORTHEASTERN OHIO CHAPTER

Warner B. Bishop, Export Sales, Werner G. Smith Co., Cleveland.
John Dreier, Equip. Supt., Elyria Wks., American Radiator & Standard Sanitary Corp., Elyria, Ohio.
Walter Handley, Fdry. Fore., The Buckeye Brass & Mfg. Co., Cleveland.
Albert W. Hitz, Madison Foundry Co., Cleveland.
A. F. Jackson, Lake City Malleable Co., Cleveland.
S. J. Miller, Lake City Malleable Co., Cleveland.
C. C. Parker, Abr. Engr., United States Rubber Co., Cleveland.
J. S. Parker, Salesman, SPO Inc., Cleveland.
R. K. Parker, Pur. Agent SPO Inc., Cleveland.
Stephen E. Parker, Appr. Molder, Fulton Foundry & Machine Co., Inc., Cleveland.
Wm. Parker, Appr. Patternmaker, Motor Patterns Co., Cleveland.
Lawrence Showalter, Fdry. Supt., Elyria Works, American Radiator & Standard Sanitary Corp.

NORTHERN CALIFORNIA CHAPTER

Woodrow O. Kelley, Met., Gen. Metals Corp., Oakland, Calif.
Peter C. Valentine, Jr., Salesman, Del Monte Properties Co., San Francisco.

James E. Williamson, Supt.-Iron Plant, General Metals Corp., Oakland, Calif.

NO. ILLINOIS-SO. WISCONSIN CHAPTER

Thomas D. Schmidt, Trainee, Gunite Foundries Corp., Rockford, Ill.
W. H. Shinn, Sales, Gunite Foundries Corp., Rockford, Ill.

NORTHWESTERN PENNSYLVANIA CHAPTER

*Ajax Iron Works, Corry, Penna. (L. S. Hixson, Fdry. Supt.)
Fredrick C. Oblom, Salesman, MacInnes Steel Sales Co., Erie, Pa.

ONTARIO CHAPTER

Louis Burnstein, Partner, Lincoln Foundry Co., St. Catharines, Ont.
Thomas Hewitt, Frm.-Brass Fdry., Canadian Westinghouse Co., Ltd., Hamilton, Ont.
Ralph B. Phillips, Engineer, Cockshutt Plow Co., Brantford, Ont.

PHILADELPHIA CHAPTER

Franklin P. Goettman, Res. Mgr., George F. Pettinos Inc., Philadelphia.
A. H. Nelson, Sales Mgr., National Pigment Co., Philadelphia.
Stanley B. Wentz, Pres., Penna. Foundry Supply & Sand Co., Philadelphia.
R. Newton Williams, Service Repr., George F. Pettinos, Inc., Philadelphia.

QUAD CITY CHAPTER

Laurence E. Anderson, Fdry. Engr., Walworth Co., Kewanee, Ill.
Wm. C. Burns, Fdry. Frm., Walworth Co., Kewanee, Ill.
Benjamin G. Luttrell, Walworth Co., Kewanee, Ill.
N. R. Mason, Fdry. Supt., Murray Iron-Works, Burlington, Iowa.
George L. Mitton, Annealing Frm., Walworth Co., Kewanee, Ill.
Laurence L. Murphy, Asst. Frm., International Harvester Co., Rock Island, Ill.
Roy E. Rodgers, Gen. Fdry. Frm., Walworth Co., Kewanee, Ill.
Frank Winquist, Frm., Walworth Co., Kewanee, Ill.

ROCHESTER CHAPTER

Royal G. Tobey, Sales Ser. X-Ray Div., Eastman Kodak Co., Rochester, N.Y.

ROCKY MOUNTAIN EMPIRE CHAPTER

A. H. Patten, Patten Engineering Co., Denver, Colo.
William James Ryan, V.-P., Eberhardt Denver Co., Denver, Colo.

SAGINAW VALLEY CHAPTER

Myron O. Booth, Plant Mgr., Central Fdry. Div., Saginaw Malleable Plant, GMC, Saginaw, Mich.
Donald L. Boyes, Mfg. Supt., Saginaw Malleable Plant-Central Fdry. Div. GMC., Saginaw, Mich.
William F. Charry Coop. Stud. Gen. Motors Institute, Chevrolet Grey Iron Fdry. Div. GMC., Saginaw, Mich.
Edsel J. Harper, Student, G.M. Institute, Flint, Mich.
Arthur D. Stover, Abrasive Engr., Electro Refractories & Alloys Corp., Buffalo.

ST. LOUIS DISTRICT CHAPTER

C. B. Bergren, Service Engr., Independent Peneumatic Tool Co., St. Louis, Mo.
Carl W. Burst, Jr., Mill Supply & Machinery Co., St. Louis, Mo.
John M. Fishell, Broker-Ferrous & Non Ferrous Cstgs. & Patt., St. Louis, Mo.
Joseph P. Ghio, Sales Repr., R. Lavin & Sons, Inc., Chicago.

SOUTHERN CALIFORNIA CHAPTER

Ned M. Field, Los Angeles Steel Casting Co., Los Angeles.
Charles S. Gallagher, Res. Mgr., Thiem Products Co., Los Angeles.
L. B. Haines, Frm., Aluminum Company of America, Los Angeles.
J. J. Thompson, Core Room Foreman, Rich Mfg. Co., Los Angeles.

TRI-STATE CHAPTER

*Big Four Foundry Co. Inc., Tulsa, Okla., (C. A. McNamara, Jr., Sec'y.-Treas.)
*Coman Pattern Works, Tulsa, Okla., (P. D. Coman, Owner.)
Harry Arnold, Appr. Pattern-Maker, Joman Pattern Works, Tulsa, Okla.
Charles B. Barker, Fdry., Supt., Enid Fdry. & Mach. Co., Enid, Okla.
Charles Dornik, Appr. Pattern-Maker, Coman Pattern Works, Tulsa, Okla.
Robert H. Ebersole, Salesman, Federated Metals Division A.S. & R. Co., St. Louis, Mo.
John Jungels, Fore., Pattern Shop, Coman Pattern Works, Tulsa, Okla.
H. E. Lahmeyer, Appr. Pattern-Maker, Coman Pattern Works, Tulsa, Okla.
E. L. Merritt, Owner, Enid Fdry. & Mach. Co., Enid, Okla.
E. F. Pugh, Pattern-Maker, Coman Pattern Works, Tulsa, Okla.
Ralph K. Richardson, Pattern-Maker, Coman Pattern Works, Tulsa, Okla.
Ben Stanley, Maint. Supt., The Acme Foundry & Machine Co., Coffeyville, Kan.
Wesley Temple, Prod. Mgr., The Acme Fdry. & Mach. Co., Coffeyville, Kan.
Glenn E. Wall, Fdry. Fore., Big Four Foundry Co., Inc., Tulsa, Okla.
H. E. Wall, V.-P., Big Four Foundry Co., Inc., Tulsa, Okla.

* Company Member.

TWIN CITY CHAPTER

Herman Madland, Asst. Fdry. Supt., American Hoist & Derrick Co., St. Paul, Minn.
David H. Smith, Met., Fergus Foundry Div., The Adelsman Co., Fergus Falls, Minn.

WASHINGTON CHAPTER

Otto Drum, Foundry, Inc., Seattle.
Robert Lefebvre, C-Miller Co. Inc., Seattle.

WISCONSIN CHAPTER

Samuel R. Durand, Application Eng., Allis-Chalmers Mfg. Co., Milwaukee.
Arthur Hertensteiner, Fdry. Supt., Kohler Co., Kohler, Wis.
Orlin C. Wolfe, Waukesha Motor Co., Waukesha, Wis.

OUTSIDE OF CHAPTER

William C. Brisse, Laconia Malleable Iron Co., Laconia, N.H.
Chas. F. Goodnow, Sec'y., Schaefer-Goodnow Foundries, Inc., Pittsburgh, Pa.
Library, Missouri School of Mines & Metallurgy, Rolla, Mo.
R. L. Ogden, Sr. Engr., Lester B. Knight & Associates, Jackson Heights, N.Y.
Robert G. Schaefer, Treas., Schaefer-Goodnow Foundries, Inc., Pittsburgh, Pa.

ARGENTINA

Ermanno Quarantotto, Engr., Compania Industrial de Electricidad, Buenos Aires.
Arsenio Gaspar Sandoval, Engr., Compania Industrial de Electricidad, Buenos Aires.

BELGIUM

S. A. Fonderies Nestor-Martin, Berchem St. Agathe, Brussels.
Ernest Waroux, Ingenieur, Societe Anonyme John Cockerill, Seraing (Belgigue).

BRAZIL

Milton Ayres de Almeida Freitas, Diretor Secretario, Fundicao Progresso S/A Sao Paulo.

CZECHOSLOVAKIA

Josef Koritta, Fdry. Mgr., Czechomoravian-Kolben-Danck, Praha-Karlin.
Ondrej Starosta, Asst. to Tech. Mgr., Zbrojovka Brno, Jawa Fdry., Tynec Nad Sazavou.

ENGLAND

E. John Pike, Almin Limited, Farmham Royal, Bucks.
Douglas Pincott, Man. Dir., Erifo Limited, Erith, Kent.

FRANCE

Technical Foundry Works, Centre Tech. des Industries de LaFonderie, Paris.

INDIA

Enos Foster Farren, Jessop & Co., Ltd., Calcutta.
J. V. Patel, Managing Dir., New Standard Engineering Co. Ltd., Bombay.

NORWAY

Bjorn Langum, Fdry. Engr., A /S Drammens Fern, Drammen.

SWEDEN

A/B Savenska & Strebelverken, Vasterick.

FUTURE CONVENTIONS AND EXHIBITS

American Society for Testing Engineers, Applied Mechanics Division, Schenectady, N.Y.—June 23-25.

American Electroplaters Society, Industrial Finishing Show, Detroit—June 23-27.

American Standards Association, Seminar on Industrial Standardization, Engineering Societies Building, New York —June 23-27.

Railway Supply Manufacturers' Convention, Atlantic City, N.J.—June 23-28.

American Society of Civil Engineers, Duluth, Minn.—July 14-18.

National Association of Power Engineers, Boston, Mass.—Aug. 25-29.

American Society for Mechanical Engineers, Fall Meeting, Salt Lake City, Utah—Sept. 1-4.

Instrument Society of America, Second National Conference, Stevens Hotel, Chicago—Sept. 8-12.

American Chemical Society, 112th Meeting, New York—Sept. 15-19.

National Machine Tool Builders' Association, Machine Tool Show, Cleveland —Sept. 17-26.

American Institute of Chemical Engineers, Regional Conference, Buffalo, N.Y.—Sept. 29-Oct. 1.

American Gas Association, San Francisco —Sept. 29-Oct. 3.

American Welding Society, National Metal Congress & Exposition, Sherman Hotel, Chicago—Oct. 20-24.

American Institute of Mechanical Engineers, Fall Meeting, Iron & Steel Div., & Institute of Metals Div., Stevens Hotel, Chicago—Oct. 20-22.

The Magnesium Association, 4th Annual Meeting, Pennsylvania Hotel, New York—Oct. 30-31.

American Society for Tool Engineers, 15th Semi-Annual Meeting, Statler Hotel, Boston—Oct. 30-Nov. 1.

FOUNDRY FIRM FACTS

General Electric Co. has announced a 1947 budget figure of one million dollars for employee education. The figure does not include "on the job" training expenditures. More than 12,000 employees and 500 instructors participate in the educational program.

The light metals foundry at 1700 El Camino Real, Belmont, Calif., formerly owned by **Dalmo Victor** and known as the **Clarkson Co.**, has been acquired by **Belmont Foundry, Inc.** W. C. Tait, president, **W. C. Tait & Co.**, heads the group of Bay Area business men now operating the Belmont plant, which has laboratory, heat treating and government-certified manodizing facilities.

Westinghouse Electric Corp., Pittsburgh, is offering a basic sound slide course on "Radio Frequency Heating" of special interest to plant engineers, metallurgists and technicians, fundamentals and applications are covered in the material, which comes in a kit for a class of 20 and is designed for a series of eight two-hour lecture units.

International Nickel Co., New York, has announced an extension of its fellowship awards for post-graduate study in the fields of nickel, copper and the platinum metals. Six two-year fellowships will be awarded biannually over a period of twelve years to Massachusetts Institute of Technology, Carnegie Institute of Technology, Yale University, the University of Michigan, the University of Illinois and Johns Hopkins University. An annual stipend and tution will be included. Awards will be made by a committee headed by Dr. Paul D. Merica, New York, vice-president of the firm.

Name of **L. E. Meidinger Co., Inc.**, 606 Wisconsin Ave., Milwaukee 3, Wisconsin state representative for **Jessop Steel Co.**, Washington, Pa., has been changed to **Bell Steel Sales.**

J. L. Finck Laboratories, 440 Rogers Ave., Brooklyn 25, has announced the addition of facilities for testing heat capacity and specific heat of metals, refractories and other materials within any range from room temperature to 2000° F. The firm, which conducts tests and research in heat insulation, can also make thermal conductivity determinations on refractories.

Flury Foundry Co., 1160 Elizabeth Ave., Lancaster, Pa., was damaged to the extent of approximately $1,500.00 in a recent fire.

Plant superintendents and production executives from 11 plants of the **Federated Metals Div., American Smelting & Refining Co.**, met for the third of a series of conferences launched in 1943 in New York May 12. Five days were devoted to discussion of methods, problems, developments and coordination of production. Dust and fume control, casting technique, refractories, furnaces, and metallurgical controls were among the topics.

Wilson & Geo. Meyer & Co., San Francisco, has opened a new sales office at 520 S. W. Sixth Ave., Portland, Ore. The firm handles industrial chemicals, foundry coke and copper compounds, as well as agricultural chemical supplies.

Birdsboro Steel Foundry & Machine Co., has purchased from the War Assets Administration the steel casting facilities built by the government to expand production at the firm's Birdsboro, Pa., plant. The properties include a casting unit of more than 65,000 square feet; a pattern storage building; an office structure, and a laboratory for testing and control.

Myers Foundry Co., a new firm, has been organized at 1222 Burlton St., S. E., Grand Rapids, Mich., by Frank, Thomas and Dale Myers, brothers. All three are experienced foundrymen. Production in gray iron and semi-steel castings has begun, and is expected to maintain a volume of five tons per day.

Pontiac Foundry & Machine Co., Pontiac Mich., recently purchased by T. C. Hackett, Detroit, and Robert Kelly, Milford, Mich., has been incorporated under the name of **Pontiac Foundry Co.**

The Coshocton, Ohio, plant of **J. W. Clow & Sons Foundry** was severely damaged in a recent fire.

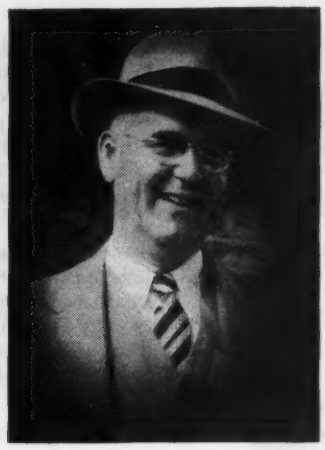
United Foundry Craftsmen Corp. has been organized in Summit, Ill., and has purchased a building there. The new firm will produce non-ferrous die-castings.

Additional photographs from the 51st Annual A.F.A. Convention held in Detroit, April 28-May 1. Top left—H. W. Lownie, Jr., Battelle Memorial Institute, Columbus, Ohio. Top right and bottom left—Two of the many filled banquet tables. Bottom right—T. E. Kihlgren, International Nickel Co., Bayonne, N. J., speaking to group at Gray Iron Session.

CHAPTER OFFICERS

J. J. Clark
Saginaw, Mich.
Director
Saginaw Valley Chapter

L. A. Kleber
General Steel Casfings Corp.
Granite City, Ill.
Director
St. Louis District Chapter



A. G. Storie
Fittings, Ltd.
Oshawa, Ont., Canada
Director
Ontario Chapter

J. R. Cochran
Sunstrand Machine Tool Co.
Rockford, Ill.
Director
No. Illinois & So. Wisconsin Chapter

John M. Robb, Jr.
Hickman Williams & Co. Inc.
Philadelphia
Director
Philadelphia Chapter

T. H. Beaulac
Chicago Pneumatic Tool Co.
Franklin, Pa.
Director
Northwestern Pennsylvania Chapter

Oscar Blohm
Triangle Foundry Co.
Chicago
Director
Chicago Chapter

B. N. Ames
U.S. Navy Yard
Brooklyn, N.Y.
Director
Metropolitan Chapter

H. B. Hanley
American Laundry Machinery Co.
Rochester, N.Y.
Director
Rochester Chapter

Floyd O. Lemmon
Ohio Steel Foundry Company
Springfield, Ohio
Director
Central Ohio Chapter

F. Ray Fleig
Smith Facing & Supply Co.
Cleveland
Treasurer
Northeastern Ohio Chapter

N. H. Boardman
Elmira Foundry
Elmira, N.Y.
Director
Central New York Chapter

★ CHAPTER ACTIVITIES ★

news

Rochester

D. E. Webster
American Laundry Machinery Co.
Chapter Director

ANNUAL BUSINESS MEETING of Rochester chapter was held May 13 at the Hotel Seneca, Rochester, N. Y.

Officers and directors proposed by the chapter nominating committee were elected by unanimous vote.

L. C. Gleason, Gleason Works, Rochester, Chapter Vice-President for 1946-47 and previously a Director, was named President.

M. T. Ganzauge, General Railway Signal Co., Rochester, who has been a Director of the chapter since its organization in 1944, was chosen Vice-President.

Secretary-Treasurer L. C. Kimpal, Rochester Gas & Electric Corp., was re-elected.

Named Directors are F. E. Adsit, Ingersoll-Rand Co., Painted Post, N. Y.; Dr. R. J. Rudebaugh, University of Rochester, and W. G. Brayer, Bausch & Lomb Optical Co., Rochester, Chapter President for the past year.

A feature of the meeting was a tribute to Chapter Director H. G. Hetzler, Hetzler Foundries, Inc., Rochester, for services rendered the foundry industry. Members of the chapter paid him honor for his enthusiasm and for loyalty to the chapter, as well as the industry, and presented him with a gift.

Chapter Director H. B. Hanley, American Laundry Machinery Co., who was the first President of Ro-

April 11 meeting of the Eastern Canada & Newfoundland Chapter held at the Mount Royal Hotel, Montreal, Que., was a combination National Officers and Student Essay Papers Night. Here A. E. Cartwright, Canadian Foundry Supplies & Equipment Ltd., Montreal, chapter vice-chairman, explains the "hows and whys" of the essay contest to the membership. Others seated at the table include (left to right) M. G. McGuiggan, Canadian Foundry Supplies & Equipment Ltd., Montreal, author of one of the papers; Mr. Cartwright; A.F.A. National Director Lee Wilson, Reading, Pa.; Chapter Chairman Henry Louette, Warden King Ltd., Montreal; A.F.A. National Director R. T. Rycroft, Kencroft Malleable Co., Inc.; A.F.A. National Director Joseph Sully, Neptune Meters Ltd., Toronto; and G. Ewing Tait, Dominion Engineering Works, Ltd., Montreal.

Top management representatives who were present at the St. Louis District chapter luncheon held May 8 at the Missouri Athletic Club, St. Louis.
(Photo courtesy Paul Schwarz, National Bearing Metals)

chester chapter and has also served as an A.F.A. Director, made the presentation.

Technical speaker of the evening was A. S. Phelps, safety engineer for Pratt & Letchworth Co., Buffalo, who discussed "Plant Safety." He described extensive studies made by his firm in the interests of furthering safe working conditions.

Orderly arrangement of materials, clean, well lighted stairways and clean floors all are vital aspects of good housekeeping—and produce results in decreased accident hazards and more efficient operation—the speaker said.

Proper instruction of employees in safe practice and the use of protective equipment where necessary are other "musts," Mr. Phelps explained. He presented a sound motion picture illustrating the points of his talk and added to his formal presentation in responding to the numerous questions raised during the discussion period.

Cincinnati District

E. F. Kindinger
Williams & Co., Inc.
Chapter Secretary

F. G. SEFING, International Nickel Co., New York, was speaker of the evening at the May 12 meeting of Cincinnati District chapter in Engineering Society Headquarters.

Discussing "The Cupola," Mr. Sefing, who is Chairman of the A.F.A. Educational Division and a member of the Gray Iron Division Advisory Group, explained both theoretical and practical aspects of its operation. Components of the charge, products of combustion, controls, and their relationship to soundness of castings were analyzed in detail.

The foundrymen demonstrated their appreciation of the importance of fundamentals, as well as refinements of cupola melting practice by raising many questions and by participating in a brisk general discussion period.

No. Illinois and So. Wisconsin

H. J. Bauman
Ebaloy, Inc.
Chapter Secretary

THE ANNUAL "Old Timers Night" meeting of Northern Illinois and Southern Wisconsin chapter May 13 at the Hotel Faust, Rockford, featured an appropriate technical session topic, "The History and Development of the Foundry Industry."

A.F.A. Director B. L. Simpson, National Engineering Co., Chicago, traced the growth of the castings industry from its early beginnings, centuries ago, to its present industrial stature. The guests of honor, who themselves contributed so notably in point of service to their chosen field, were given a picture of the amazing accomplishments of the foundrymen of antiquity and of the steady march of foundry technology up through the ages.

At the chapter's April 8 meeting in the Hotel Faust, Ken Lange, Link-Belt Co., Chicago, was the technical speaker on "Moving Materials in a Foundry." He described the contributions of modern materials handling equipment to making the foundry a good place to work and raising the level of castings production. The speaker also illustrated, through the use of a series of slides, mechanized operations in modern foundries.

Western New York

L. A. Merryman
Tonawanda Iron Corp.
Chapter Secretary

CASTING DEFECTS was the topic of the technical session at the May 9 meeting of Western New York chapter in the Hotel Touraine, Buffalo. W. A. Hambley, Slinger Foundry Co., Slinger, Wis., Chairman of the Analysis of Casting Defects Committee, A.F.A. Gray Iron Division, was the speaker.

Thirty types of defects and ten causes responsible wholly or in part were listed by Mr. Hambley. Of the 30, he pointed out, 24 are traceable to faulty pouring, an aspect of casting that generally receives little consideration.

"We are interested in casting defects," the speaker said, "because our livelihood depends upon the production of good castings." He stressed the increase in scrap losses attributable to current shortages in materials and resultant substitutions and changes in practice.

Tracing Defect Cause

To cure a defect, Mr. Hambley told the foundrymen, the first step is to trace down the real cause. This requires careful metallurgical analysis; yet each defect has a basic cause which can be determined.

The speaker presented slides illustrating various types of defects and explained the proper remedy for each.

Chapter Chairman H. C. Winte, Worthington Pump & Machinery Corp., Buffalo, was presiding officer.

At the April 4 meeting in the Hotel Touraine, the chapter heard C. E. Westover, Westover Engineers, Milwaukee, discuss foundry costs and cost controls. Chapter Vice-Chairman E. R. Jones, Lumen Bearing Co., Buffalo, presided.

A.F.A. National Vice-President Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., (second from left) talking to Dr. C. H. Lorig, Battelle Memorial Institute, Columbus, Ohio, prior to the A.F.A. Chesapeake chapter meeting March 17. Mr. Lorig was the guest speaker at a joint meeting of the A.F.A. group and ASM Baltimore chapter. Dr. Carl Zapffe, consulting metallurgist, Baltimore, ASM, sits at Mr. Lorig's left.

Mr. Westover analyzed cost factors in foundry operation, with particular emphasis on industrial relations and wage incentives. He was greeted with a barrage of questions during the general discussion period, and responded to the interests of his audience by branching into many other aspects of cost control. He was called upon to expand his prepared presentation in response to the many questions brought up at the conclusion of his talk.

Philadelphia

H. V. Witherington
H. W. Butterworth & Sons Co.
Chapter Director

THE TECHNICAL SUBJECT of the May 9 meeting of Philadelphia chapter in the Engineers Club, Philadelphia, produced an unusually interesting general discussion period. "Synthetic vs. Natural Sand for Cast Iron" was the topic and A. S. Wright, Hunt-Spiller Mfg. Corp., Boston, the speaker. George Bradshaw, Philadelphia Naval Yard, served as technical chairman for the evening.

Mr. Wright held the attention of the members and guests with his many observations based on experiences in producing similar castings in both natural and synthetic sands.

Central New York

J. A. Feola
Crouse-Hinds Co.
Chairman, Publicity Committee

GOOD HOUSEKEEPING and improved metallurgical controls and their relationship to foundry scrap losses were highlighted in the discussion of "Casting Defects" presented at Central New York chapter's May 9 meeting in the Onondaga Hotel, Syracuse. George Johnstone, Jr., Johnstone Foundries, Inc., Grove City, Pa., was the speaker and Chapter Chairman E. E. Hook, Dayton Oil Co., Syracuse, the presiding officer.

Scrap Loss Rates

Some foundries accept five to ten percent scrap losses as normal, while others—utilizing proper controls and practicing good housekeeping—operate with losses of one percent or less, Mr. Johnstone said.

Good working conditions, periodic check of controls and maintenance of equipment in good repair, are easily justified by reduction in losses, the speaker stated. Another advantage of the practices, he added, is that such conditions attract employees to the industry.

Test results can be obtained from pilot runs and used as standards in

"The Happy Gang," members of the Eastern Canada and Newfoundland chapter, traveling to Toronto on a private pullman to attend the first All-Canadian Conference held in Toronto recently.

Around the dinner tables at the April 3 meeting of the Saginaw Valley Chapter at Frankenmuth, Mich.

the cleaning and salvaging departments, which will result in a reduction of scrap losses, Mr. Johnstone suggested. He demonstrated, through presentation of slides showing flask equipment, patterns, gating and risering techniques an determinations of metal temperatures, pouring times and sand conditions, the results of the practices under consideration.

Northeastern Ohio

R. H. Herrmann
Penton Publishing Co.
Chapter Reporter

OLD TIMERS NIGHT drew the season's record attendance of 320 members and guests of Northeastern Ohio chapter for the May 8 meeting in the Cleveland Club, as nearly 100 veterans of the foundry industry were honored by the group.

A.F.A. Director B. L. Simpson, National Engineering Co., Chicago, and 12 past presidents of the chapter were on hand for the occasion.

Jules Mathews, SPO, Inc., Cleveland, with 72 years in the castings fields, topped all the old timers in point of service. Others with more than 60 years association with the foundry industry were B. D. Fuller, retired, 66 years; J. A. Horning, Ohio Foundry Co., and G. H. Zimmerman, Eberhard Mfg. Co., 65 years, and H. M. Oehling, National Malleable & Steel Castings Co., 61 years, all of Cleveland.

Of the guests of honor, 22 had service records of 50 or more years.

Officers and directors nominated at the April meeting were elected at the brief business session. Chapter President H. J. Trenkamp, Ohio Foundry Co., Cleveland, presided at this overflow meeting.

New Chapter Officers

Chosen President for 1947-48 was H. C. Gollmar, Elyria Foundry Div., Industrial Brownhoist Corp., Elyria, Ohio, who has served as a director.

E. C. Zirzow, National Malleable & Steel Castings Co., who completes a term as Director this year, is the new Vice-President.

R. D. Walter, Werner G. Smith Co., Cleveland, was named Secretary and F. Ray Fleig, Smith Facing & Supply Co., Cleveland, re-elected Treasurer.

Chapter Directors Elected

Directors elected to terms expiring in 1950 are G. M. Cover, Case School of Applied Science, Cleveland; E. G. Fahlman, Permold Co., Medina, Ohio; and G. J. Nock, The Nock Fire Brick Co.; John Schneider, Cleveland Electric Illuminating Co., and J. M. Urban, Fanner Mfg. Co., all of Cleveland.

St. Louis District

J. W. Kelin
American Smelting & Refining Co.
Chapter Reporter

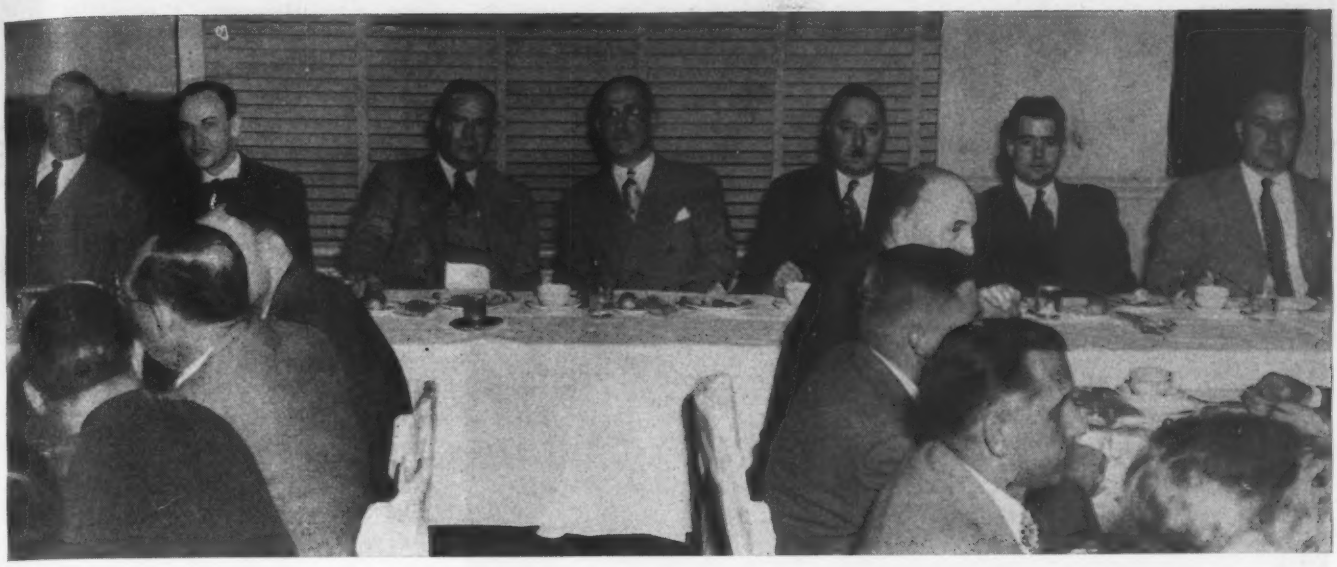
FOUNDRYMEN of the St. Louis district were hosts to A.F.A. President S. V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis, May 8.

It was a banner day for St. Louis District chapter, which drew its largest attendance of the season to the dinner meeting in the York Hotel for the "National Officers and Past Chairmen's Night" program.

President Wood met with chapter officers and representatives of top management from foundries in the area at a luncheon, where he spoke on the activities and objectives of the Association. Also on hand were H. F. Scobie of the A.F.A. National Office and J. L. Yates, National En-

A.F.A. President S. V. Wood addressing members and guests of the St. Louis District chapter at a management luncheon held May 8 at the Missouri Athletic Club.

(Photo courtesy Paul Schwarz, National Bearing Metals)



Speakers table at the management luncheon held by the St. Louis District chapter, May 8, Missouri Athletic Club, was composed as follows: (left to right) R. E. Woods, M. W. Warren Coke Co., St. Louis; H. F. Scobie, A.F.A. Educational Assistant, Chicago; A.F.A. President S. V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis; R. T. Leisk, American Steel Foundries, East St. Louis, Ill.; Jas. L. Yates, National Engineering Co., Chicago; N. F. Peukert, Carondelet Foundry Co., St. Louis; and A. S. Hard, St. Louis Steel Casting Co., St. Louis.

(Photo courtesy Paul Schwarz, National Bearing Metals)

gineering Co., Chicago, who was speaker at the evening meeting.

In the afternoon, Mr. Wood met with the chapter board of directors. Climax of the day's activities was the dinner meeting, with Chapter Chairman R. T. Leisk, American Steel Foundries, East St. Louis, Ill., presiding at the business session and Chapter Vice-Chairman Norman Peukert, Carondelet Foundry Co., St. Louis, as program chairman.

Lapel pins were presented to six past chairmen of the group, and Chapter Secretary R. E. Woods, M. W. Warren Coke Co., St. Louis, read the meeting letters of greeting from several others who were unable to be present for the occasion.

President Wood addressed the chapter briefly. He presented his observations on activities of A.F.A. chapters all over the nation he had visited during the past year and pointed out the benefits to the individual and the industry of participation in the technical-educational programs. Contributions of the Association to the advancement of the technology of foundry practice were also cited by Mr. Wood.

Foundry Dust Control

"Engineering as it Affects the Foundry" was the subject of Mr. Yates at the technical session. The role of good housekeeping in making the foundries attractive places in which to work was underscored by the speaker. He also presented a number of slides illustrating foundry mechanization and dust control for various operations. The proper use of compressed air for many foundry applications was another aspect of modern practice described by Mr. Yates, who concluded his address by answering questions from members and guests.

Birmingham District

J. P. McClendon
Stockham Pipe Fittings Co.,
Chairman, Publicity Committee

W. E. JONES, Stockham Pipe Fittings Co., Birmingham, was elected Chairman of the Birmingham District chapter at the annual business meeting May 9 in the Tutwiler Hotel, Birmingham. He has been Vice-Chairman for the past year.

Dr. J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, who completes a three-year term as Director this year, was named Vice-Chairman and F. K. Brown, Adam, Rowe & Norman, Inc., was re-elected Secretary-Treasurer.

Elected Directors, to serve until 1949, are F. S. Middleton, Jr., Production Foundries Div., Jackson Industries, Inc., Birmingham, and F. T. Hamilton, Rudisill Foundry, Aniston, Ala.

Named to serve as Directors for one year are J. E. Getzen, Harry G. Mouat Co., Birmingham, and T. H. Benners, Jr., T. H. Benners & Co., retiring Chairman.

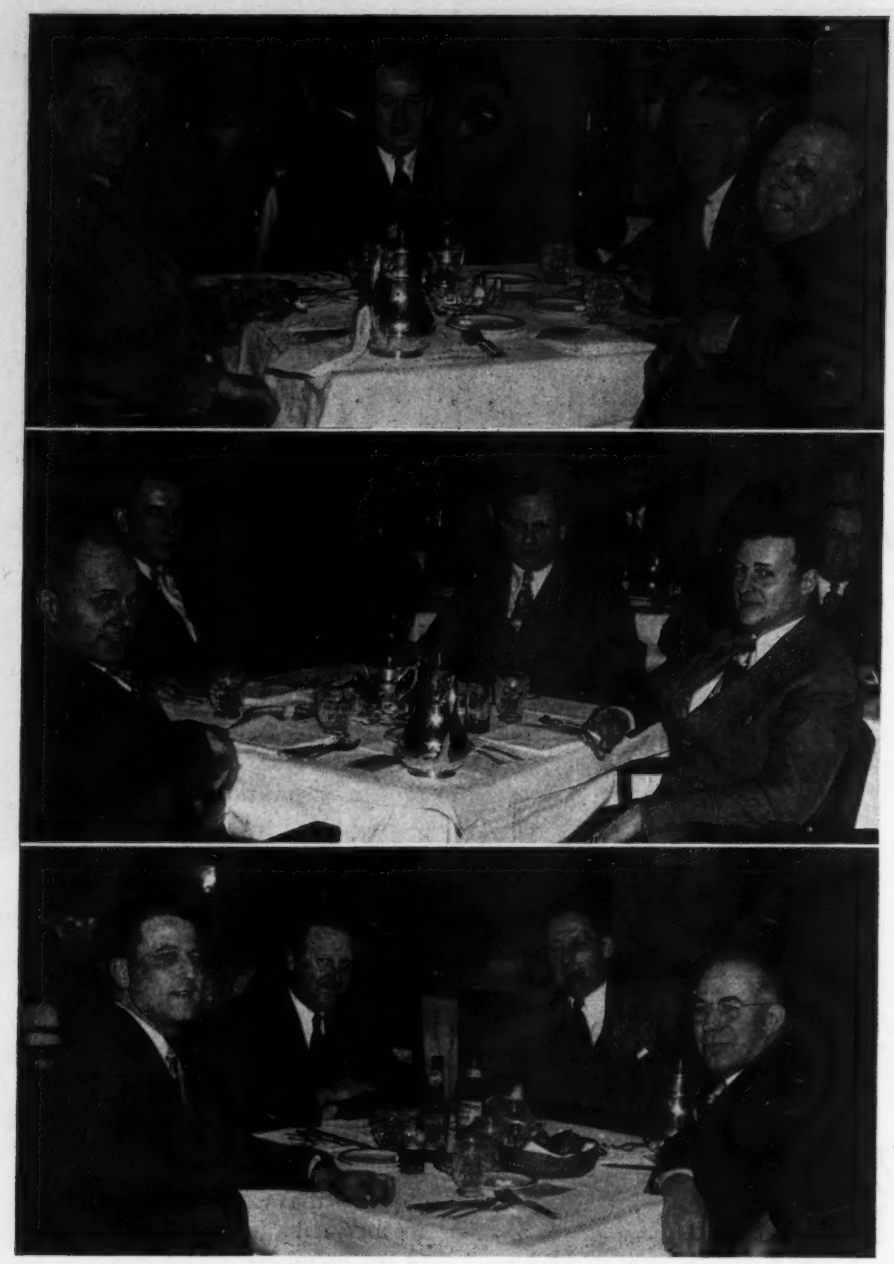
Technical session of the evening featured a "Quiz Program," with a "board of experts" handling questions on gray iron, steel, non-ferrous metals, cores and coke. "Quiz Chairman" Morris Hawkins, Stockham Pipe Fittings Co., kept the board on its toes as he served up the queries of the members.

Metropolitan

B. K. Price
Penton Publishing Co.
Chapter Reporter

A CASTING is no better than the pattern from which it is produced, L. F. Tucker, City Pattern & Foundry Co., South Bend, Ind., told members and guests of Metropolitan chapter at the May 5 meeting in the Essex House, Newark, N. J.

Close cooperation between patternmaker and foundryman is necessary for best results in castings production, the speaker asserted. He emphasized the value of such teamwork in many aspects of foundry practice and cited draft and shrinkage problems as typical. Checking



Continental Foundry & Machine Co., East Chicago, Ind., was represented by the following men at the April 7 meeting of the Chicago chapter (top) left to right William Hansen, Lave Gustafson, Jack Kenedy and Martin Rintz, and (center) left to right Eugene Sommer, Carl Evans, Harry Lynch and Gilbert Crontz. These four gentlemen felt much better after their dinner (bottom) left to right R. W. Benett, Metro-Nite Co., Milwaukee; Frank Wartgow, A.F.A., Chicago; E. H. Weak, American Steel Foundries, Indiana Harbor, Ind., and Harry L. Charlson.

shrinkage with experimental castings is advisable where it is at all feasible, Mr. Tucker said.

In a brief outline of the history of patternmaking, he pointed out the influence of the automobile industry upon the development of precision patterns. The demand of this industry for high-volume production of castings had a revolutionary effect upon patternmaking techniques and materials, it was stated.

Large foundries, today, often employ a pattern engineer who is charged with the responsibility of selecting the best equipment for a given job, Mr. Tucker explained in concluding. However, he added, smaller foundries with a more limited staff do not generally have such an engineer; and it is especially essential for them to establish the closest cooperation between foundry and pattern departments.

At the business session, the members elected new officers and directors.

K. A. DeLonge, International Nickel Co., New York, was elected Chairman. He has been Vice-Chairman for the past season.

John Bukowski, Worthington Pump & Machinery Corp., Harrison, N. J., is the new Vice-Chairman. He has served as a Director.

Secretary J. F. Bauer, Hickman, Williams & Co., and Treasurer D. Polderman, Jr., Whiting Corp., both of New York, were re-elected.

Directors elected are R. A. Flinn, American Brake Shoe Co., Mahwah, N. J.; W. F. Rose, Smith Oil & Refining Co., Ramsey, N. J.; R. D. Speirs, Wright Aeronautical Corp., Wood-Ridge, N. J.; D. W. Talbott, Cooper Alloy Foundry Co., Hillside, N. J., and J. S. Vanick, International Nickel Co., New York.

Mr. DeLonge presided at the business session and James Thomson, Fuchs & Thomson, Jersey City, N. J., was technical chairman.

Chicago

G. J. Biddle
Illinois Clay Products Co.
Chapter Reporter

ROUND TABLE DISCUSSIONS on gray and malleable iron, steel and nonferrous metals featured the last technical session of the season at Chicago chapter's May 5 meeting in the Chicago Bar Association.

At the business session Larry H. Hahn, Sivyer Steel Casting Co., Chicago, retiring Chapter President, was presented with the traditional "Oscar" statuette of the American foundryman by the new President, F. B. Skeates, Link Belt, Chicago.

Chapter Officers

C. K. Faunt, Christensen & Olson Foundry Co., Chicago, has been elected Vice-President for 1947-48 and Victor Rowell, Velsicol Corp., Chicago, Secretary.

A.F.A. National Director B. L. Simpson, National Engineering Co., Chicago, continues to serve as Treasurer of the chapter.

Directors elected to terms expiring in 1950 are G. W. Anselman, Goebig Mineral Supply Co., W. B. George, R. Lavin & Sons, Inc., and

R. M. Jones, Carnegie-Illinois Steel Corp., all of Chicago.

Rocky Mountain

J. R. Maclear
Maclear Mfg. & Supply Co.
Chapter Reporter

MANUFACTURE of grinding wheels and their applications in foundries provided an interesting technical session topic for the April 22 meeting of Rocky Mountain chapter in the Oxford Hotel, Denver.

Chapter Chairman J. L. Higson, Western Foundry Co., Denver, was the presiding officer. Featured speaker was R. O. Anderson, district manager for Norton Co., who included in his presentation a motion picture illustrating processes of manufacture and the range of application of grinding wheels.

Chesapeake

REFRACTORIES for the foundry was the subject of C. A. Brashares, Harbison-Walker Refractories Co., Pittsburgh, at the technical session of Chesapeake chapter's April 25 meeting in the Engineers' Club, Baltimore, Maryland.

The speaker covered applications of refractories in gray iron, malleable iron and steel foundries. Extruded, hard-burned foundry blocks, which are hard, dense and high in strength, are most often used in lining cupolas, Mr. Bra-

Enough cannot be said for the efforts put forth by the Eastern Canada & Newfoundland chapter's Entertainment Committee. Best testimonial for their efforts is that the "standing room only" sign had been hung out weeks in advance for a number of functions especially the stag party held April 18. Committee members shown below are (seated, left to right) L. Beaudry, Warden King Ltd., Montreal; L. Guilmette, Canadian Foundry Supplies & Equipment Ltd., Montreal; J. Shewan, Canadian Car & Foundry Co. Ltd., Montreal; R. E. Cameron, Webster & Sons, Ltd., Montreal. Standing (left to right) A. E. Cartwright, Canadian Foundry Supplies & Equipment Ltd., Montreal; P. B. Savoie, Webster & Sons, Ltd., Montreal; Emile Gervais, Warden King Ltd., Montreal; M. A. Hughes, LaSalle Coke Co., Montreal; O. L. Voisard and E. Laurendeau, Robert Mitchell Co. Ltd., Montreal; A. J. Moore, Montreal Bronze Ltd., Montreal, and J. H. Newman, Chamberlain Engineering (Canada) Ltd., Montreal.

The feminine touch to this page is contributed by wives and girlfriends of chapter members and guests who attended the Second Annual Ladies Night party sponsored by the Southern California chapter which was held on April 19 at the Lakewood Country Club.

Detroit Mayor Edward J. Jeffries proclaimed April 28-May 1 Foundry Week in Detroit. He is pictured handing foundry week proclamation over to J. L. Mahon, American Car & Foundry Co., Detroit as (left to right) W. W. Maloney, A.F.A. Secretary, Chicago; A.F.A. Past President Fred J. Walls, International Nickel Co., Detroit, and Detroit Chapter Chairman A. H. Allen, Penton Publishing Co., Detroit, look on.

shares reported. Pressed cupola blocks are used in many foundries because of greater homogeneity and resistance to thermal shock, he added, and handmade brick when greater toughness is desired.

A frequent cause of failure of cupola linings is non-conformity of the curvature of the brick to that of the furnace itself, the speaker pointed out. Discussing further the installation of the lining, he noted that, because the expansion of the steel shell is greater than that of the refractory lining, many foundries allow little or no clearance. This is a satisfactory practice, Mr. Brashares said, if heating is done slowly; however, foundries which heat rapidly may well use a fill of fire clay or similar material between the shell and the refractory as an added precaution to retain heat.

Speaking of maintenance, he stressed the importance of proper cleaning of the lining before patching, and recommended the use of a fire clay of good refractoriness and an aggregate of crushed fire brick or silica sand.

In steel foundry practice, Mr. Brashares said, roof refractories are usually silica and either silica brick or basic brick is used in the walls. For the bottom of the acid furnace a mixture of clay and ganister is used, and sizing of the ganister is important, he told the foundrymen, adding that a rammed magnesite bottom is necessary in the basic furnace.

Canton District

N. E. Moore
Wadsworth Testing Laboratory
Chapter Reporter

FOUNDRY PRACTICE was the topic of the technical session at Canton District chapter's last meeting of the season April 17 in Yant's Cottage, Canton, Ohio. E. C. Troy, Dodge Steel Co., was the speaker. Chapter Chairman I. M. Emery, Massillon Steel Castings Co., Massillon, presided over the evening meeting.

In his presentation Mr. Troy described proper techniques in venting and molding and the application of neck-down risers, stressing the importance of careful observ-

March 3 the Central Indiana Chapter held National Officer Night. Seated at the head table are: (left to right) Paul V. Faulk, Electric Steel Castings Co., Indianapolis; V. A. Crosby, Climax Molybdenum Co., Detroit; Chapter Chairman J. P. Lentz, International Harvester Co., Indianapolis; W. B. George, R. Lavin & Sons, Inc., Chicago; F. E. Wartgow, A.F.A., Chicago; Ray Fickenworth, C & G Foundry & Pattern Works, Inc., Indianapolis; and W. Ziegelmueller, Electric Steel Casting Co., Indianapolis.

ance of fundamental principles in daily practice.

New chapter officers and directors, elected by mail balloting, were announced at the business meeting.

C. F. Bunting, Pitcairn Co., Barberton, Ohio, who has been Vice-Chairman for the past twelve months, was elected Canton District chapter chairman.

E. H. Taylor, F. E. Myers & Bros. Co., Ashland, Ohio, who completes a term as Chapter Director this year, was named Vice-Chairman and J. L. Dickerson, Pitcairn Co., Secretary.

Chapter Treasurer O. D. Clay, Canal Fulton, Ohio, was re-elected.

Chosen as Chapter Directors are:

Term expires 1948, M. G. Winter, Winters Foundry & Machine Co., Canton (central area); F. C. Glass, Deming Co., Salem, Ohio (eastern area), and Charles Scoville, Babcox & Wilcox Company, Barberton, (western area).

Term expires 1949, G. C. Biggert, United Engineering & Foundry Co., Canton; C. E. Shaw, American Steel Foundries, Inc., Alliance, Ohio, and T. W. Harvey, Pitcairn Co. (central, eastern and western directors, respectively).

Term expires 1950, N. E. Moore, Wadsworth Testing Laboratory, Canton; H. G. Stevener, American Steel Foundries, Inc., and J. W. Fairburn, Ashland Malleable Iron Co., Ashland (respectively, central, eastern and western area).

Connecticut Non-Ferrous

L. G. Tarantino
Niagara Falls Smelting & Refining Co.
Association Secretary

HISTORY AND DEVELOPMENT of silicon carbide and its application as a production tool of today were featured at the April 16 meeting of the Connecticut Non-Ferrous Foundrymen's Association in the Hotel Taft, New Haven. F. D. Bowman, Carborundum Co., Niagara Falls, was technical speaker on "Precision Grinding."

Discovery of silicon carbide, in 1891, and early experiments in its use were outlined by the speaker. First application of the new material, found to be second in hardness only to the diamond, was as a substitute for diamond dust in the gem polishing and mechanical industries. After further experimentation, a product suitable for foundry applications was made available.

Synthetic resin bonded wheels, cutting at a speed of 9500 surface feet per minute; the cotton fiber bonded wheel; diamond wheels, and "green grit" wheels were cited as among latest developments. Abrasive particles of 400 to 1000 mesh are

J. L. Lucas, Meehanite Metal Corp., New Rochelle, N.Y., speaking at the April 3 meeting of the Saginaw Valley Chapter in Frankenmuth.

Four hundred and fifty Wisconsin chapter members and guests turned out for the Old Timers and Apprentice Night banquet held May 9 at the Schroeder Hotel, Milwaukee. Approximately 75 Old Timers and 109 apprentices were on hand for the meeting.

produced for optical work, Mr. Bowman said.

The two types of abrasive most commonly used are silicon carbide and aluminum oxide, he told the foundrymen. Manufacturers, he said, produce about 30 types of wheels, varying in grain and grit sizes and performance characteristics. A sound film showing the production of silicon carbide from coke, salt, sawdust and sand and the operations of molding, baking, mixing and sizing of grains under laboratory control, was presented by the speaker.

At the March 19 meeting in the Hotel Taft, the group heard S. W. Chappell, Electric Boat Co., Groton, Conn., discuss "Centrifugal Casting of Bronze." D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., served as technical chairman for the evening.

Mr. Chappell presented an interesting study of the casting of torpedo tubes, describing the original static casting methods, the difficulties involved in production by centrifugal casting, and the techniques applied in overcoming the problems and initiating successful production by the latter method. Development of molding methods also was commented upon.

Northern California

C. R. Marshall
Chamberlain Co.
Chairman, Publicity Committee

REFRACTORIES can be designed for specific applications and their properties altered in the manufacturing process in the interests of results desired, W. E. Daugherty explained to members and guests of Northern California chapter at the April 11 meeting in the Engineers' Club, San Francisco.

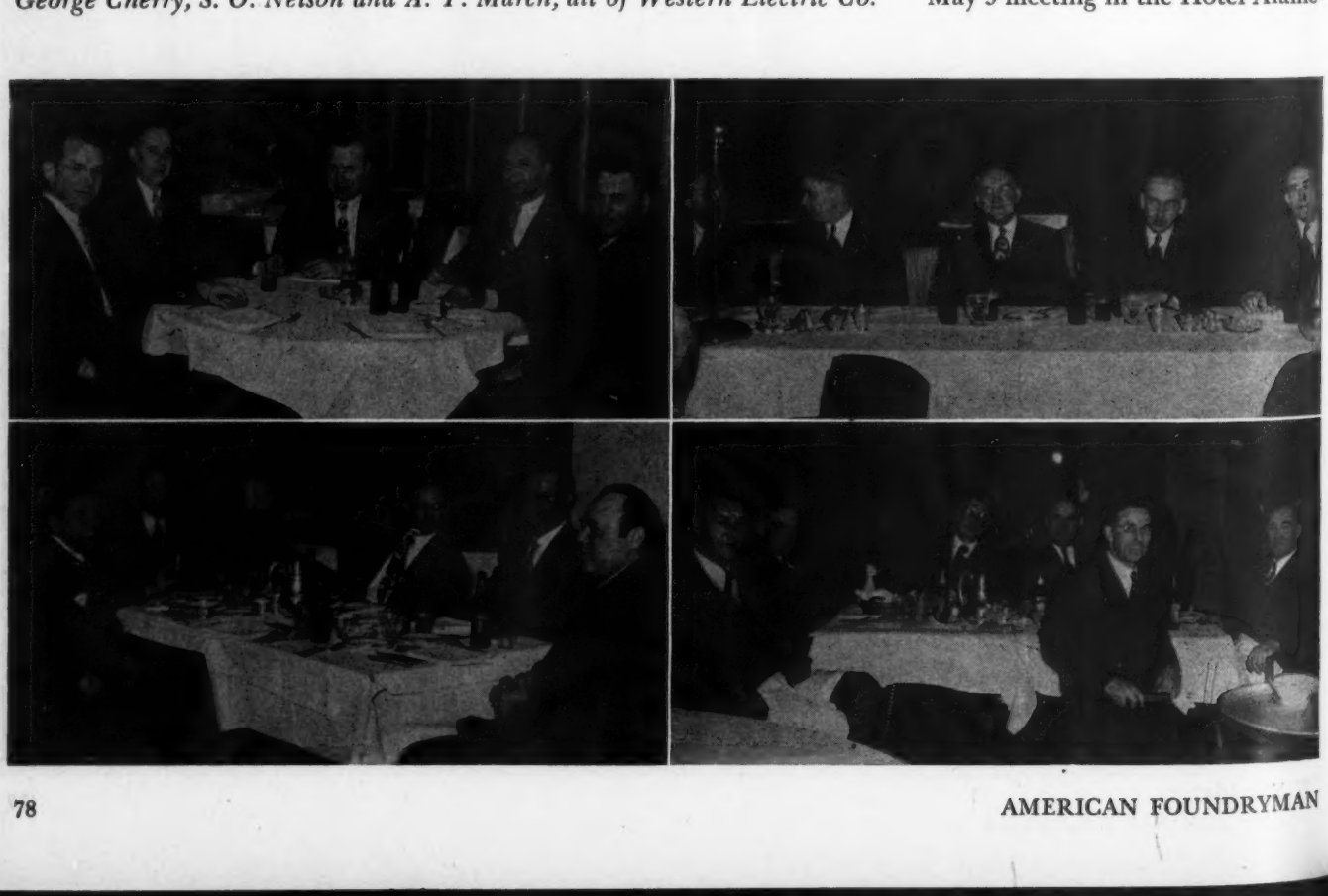
The speaker, refractories manager for L. H. Butcher, Los Angeles, told the foundrymen that the manufacturer has the choice of various materials with which to anticipate acid, basic or neutral conditions to be met. In addition, the amount of heat and abrasion by mechanical forces expected must be considered in preparation of the lining, he said.

"You can get best results from the refractory you use in your particular operation if you give the manufacturer details in regard to the practices involved," Mr. Daugherty pointed out. It is important, too, said the speaker, to follow up with a report to the manufacturer on performance of the material. Through careful consultation the foundryman can find the right refractory for his purpose, he concluded.

Chapter President Richard Vosbrink, Berkeley Pattern Works, Berkeley, presided at the business meeting; J. L. Francis, Vulcan Foundry Co., Oakland, served as program chairman.

T. E. Barlow, Battelle Memorial Institute, Columbus, Ohio, was the technical speaker at the chapter's May 9 meeting in the Hotel Alame-

Shades of the April 7 Chicago chapter meeting held at the Chicago Bar Association. Top left (left to right) John Owen, Harbison-Walker Refractories, Chicago; W. Harrison and Harry Evans, Allied Steel Castings Co., Chicago; and R. McKamen and Z. Czarnecki, Industrial Castings, South Beloit, Ill. Top right (left to right) Chapter President Larry Hahn, Sivyer Steel Castings Co., Chicago; Carl Taylor, president Waukesha State Bank, Waukesha, Wis., and guest speaker; Chapter Vice-President F. B. Skeates and Harold Hoffman, Link-Belt Co., Chicago and Deming Lucas, Chicago. Bottom left (left to right) Jules Parisi and Joseph Scoville, Pekay Machine & Engineering Co., Chicago; Roy Taylor, Illinois Clay Products Co., Joliet, Ill. and C. F. Seman and J. Mahr, Illinois Malleable Iron Co., Chicago. Bottom right (left to right) P. W. Fromm and G. H. Frank, Western Electric Co., Chicago; David G. Anderson, National Founders Association, Chicago; George Cherry, S. O. Nelson and A. T. March, all of Western Electric Co.



da, Alameda. The occasion was the annual "Old Timers and Apprentices Night," and the speaker handled a topic of the keenest interest to all foundrymen, "Practical Inoculation."

In his discussion, Mr. Barlow, who is a member of the Gray Iron Division's Analysis of Casting Defects Committee and has served as Chairman of the Subcommittee on Inoculated Iron, covered the major aspects of successful cupola operation. He outlined to the chapter members and their guests the fundamentals, and the finer points of inoculation and went into detail on latest techniques and research.

Twin City

Alexis Caswell
Minneapolis Chamber of Commerce
Chapter Secretary-Treasurer

ELECTION of officers and directors of Twin City chapter was held at the annual business meeting April 17 in the Curtis Hotel, Minneapolis.

S. P. Pufahl, Pufahl Foundry, Inc., Minneapolis, was chosen as Chairman for 1947-48. Vice-Chairman for the past season, he also served previously as a director.

Named Vice-Chairman was I. F. Cheney, Griffin Wheel Co., St. Paul, who completes a term as Director.

Secretary-Treasurer Alexis Caswell, Minneapolis Chamber of Commerce, was re-elected.

Directors chosen to serve for three years are F. A. Austin, Crown Iron Works, Minneapolis; C. J. Becker, Union Brass & Metal Mfg. Co., St. Paul, and F. J. Marrin, Marrin Foundry, Minneapolis.

Wisconsin

R. C. Woodward
Bucyrus-Erie Co.
Chapter Secretary

OFFICERS for the coming season and three directors were elected by Wisconsin chapter at its April 11 meeting.

R. J. Anderson, Belle City Malleable Iron Co., Racine, was named President. He has been Vice-President for the past twelve months, and previously served as Secretary and as a director of the chapter.

Named Vice-President was R. C. Woodward, Bucyrus-Erie Co., South Milwaukee, Secretary for 1946-47.

A. C. Haack, Wisconsin Grey Iron Foundry Co., Milwaukee, who has been a director for the past three years, was chosen as Secretary and R. F. Jordan, Sterling Wheelbarrow Co., Milwaukee, Treasurer, was re-elected.

Directors elected to serve for three years are W. W. Edens, Ampco Metal, Inc.; A. F. Pfeiffer, Allis-Chalmers Mfg. Co., West Allis, and J. G. Risney, Risney Foundry Equipment Co., Milwaukee.

At the technical session, R. A. Quadt, Federated Metals Division, American Smelting & Refining Co., Perth Amboy, N. J., discussed "Common Foundry Problems in Aluminum Castings." Relatively simple precautions can go far to eliminate improper practices in the aluminum foundry, he said, once the foundryman understands the basic sources of troubles encountered.

The speaker presented specific recommendations on three vital production steps: melting and alloying; pouring, and mold production. Highlights of his remarks: preheating is strongly urged as a precaution against gassed metal; nascent hydrogen, produced from moisture and hydrocarbons during melting, is the chief source of gassing in aluminum castings; flushing the melt with chlorine and dry nitrogen to remove undesirable gases is common practice today.

Hold After Stirring

He urged a 15-minute holding period after any necessary stirring of the molten metal and presented data to support the belief that the trapping of oxides and fluxes in the metal is minimized by avoidance of agitation. In covering mold design, Mr. Quadt emphasized that proper planning of gates and risers is of the utmost importance in the production of a sound casting.

Eastern Canada-Newfoundland

R. E. Cameron
Webster & Sons, Ltd.
Chapter Secretary

A.F.A. DIRECTORS were guests of Eastern Canada and Newfoundland chapter at its "National Officers Night" meeting April 11 in the Mount Royal Hotel, Montreal, Que.

R. T. Rycroft, Kencroft Malleable Co., Inc., Buffalo, N. Y.; Joseph Sully, Sully Foundry Div., Neptune Meters, Ltd., Toronto, and L. C. Wilson, Reading, Pa., were present for the occasion.

Three technical papers, entered in a chapter-sponsored competition, were featured on the technical program: "Sand Control in the Foundry," by E. Gervais, Warden King, Ltd.; "Prevention of Shrinkage Defects by the Use of Tellurium Corewashes," by W. P. Sullivan of the same firm, and "Selection and Use of Molding Machines," by M. G. McQuiggan, Canadian Foundry Supplies & Equipment, Ltd., all of the Montreal district.

Chapter Officers

The chapter chose A. E. Cartwright, Canadian Foundry Supplies & Equipment, Ltd., present Vice-Chairman, as Chairman for 1947-48.

New Vice-Chairman is O. L. Voisard, Robert Mitchell Co., Ltd., Montreal. He is completing a term as Director this year.

J. G. Hunt, Dominion Engineering Works, Ltd., was elected Secretary; and L. Guilmette, Canadian Foundry Supplies & Equipment, Ltd., re-elected Treasurer.

Named Directors, terms expiring in 1950, are Rene Belisle, La Cie J. A. Gosselin, Ltd., Drummondville, Quebec; James Grieve, Dominion Engineering Works, Ltd.; W. F. Hillis, Hillis & Sons, Ltd., Halifax, Nova Scotia; M. A. Hughes, La Salle Coke, Ltd., Montreal, and W. T. Shute, Canadian Car & Foundry Co., Ltd., Longue Pointe, Quebec.

Chapter Chairman Henry Louette, Warden King, Ltd., presided.

Central Indiana

Robert Langsenkamp
Langsenkamp-Wheeler Brass Works
Chapter Secretary

"CHEMICALLY COATED SAND," a new development in foundry technology, was the technical session topic at the April 7 meeting of Central Indiana chapter in the Athenæum, Indianapolis.

N. J. Dunbeck, Eastern Clay Products, Inc., Jackson, Ohio, Chairman of Central Ohio A.F.A. chapter, was the guest speaker. Technical chairman was Jack Gid-

(Concluded on Page 93)

★ JUNE WHO'S WHO ★

D. F. Sawtelle

Author of *Finishing and Inspection, Mechanized Malleable Foundry*. . . . From 1916-18 attended Yale University, New Haven, Conn., and enrolled in a special course in chemistry. . . . Began his industrial career in 1915 with the New Haven Gas Light Co. as analytical chemist. . . . In 1928 assumed the position of assistant chief chemist for the Connecticut Coke Co. . . . Two years later (1930) was named metallurgist of the Malleable Iron Fittings Co., Branford, Conn. . . . A member of the A.F.A. Sand Division Executive Committee, he also serves as chairman of the Sand Shop Operation Course subcommittee and the Flowability Committee. . . . Has participated in many annual meetings of A.F.A., acting as chairman and co-chairman of technical sessions. . . . Is a past chairman of the New Haven chapter, ASM and is a past president of the Connecticut Foundrymen's Association. . . . A member of ASM, Malleable Founders Society, Steel Founders Society of America, and of the American Foundrymen's Association.

Nathan Janco

Gates and Risers, Calculation of Sizes has been contributed by Nathan Janco, president, Centrifugal Castings Machine Co., Tulsa, Okla. . . . The writer is a graduate of New York University, New York. . . . Receiving his engineering degree in 1932, he continued and obtained a master's degree two years later. . . . Following his graduation he began an industrial career as engineer with Carter Oil Co. (1934-35) and Petroleum Engineering Inc. (1935-36) both of Tulsa. . . . He assumed the position of division manager, Reed Roller Bit Co., Houston, Texas, until 1940 when he returned to Tulsa to assume ownership of his present company. . . . He has also served as a consulting engineer, from 1940 to the present. . . . His writings have been published by the trade press and have been concerned with centrifugal castings and heat transfer. . . . His papers have been read before a number of meetings of technical societies. . . . Mr. Janco is a member of A.F.A., ASM, ASME, and American Physical Society.

T. W. Curry

T. W. Curry, metallurgist, Lynchburg Foundry Co., Lynchburg, Va. contributor of *New Process Chemically Treats Molding Sand* can speak authoritatively on this new process because of the major role he played in its first successful commercial application. . . . In January, 1946, he visited the Wilson Foundry & Machine Co., Pontiac, Mich., where early experimental work was started. . . . He returned to Lynchburg and reported, with such enthusiasm on his observation there, and on his belief in the possibility in the new method, that the management of Lynchburg embarked upon the experimental program which cumulated in the change over to this new type of sand . . . Holds a membership in A.F.A. and is a metallurgical graduate of Pennsylvania State College.

The Foundry Is A Good Place To Work

O. E. Lawson

Foundry instructor, O. E. Lawson, is the author of *Practical Vocational Guidance* which appears in this issue. . . . He has been active in the foundry industry since 1921 when he was connected with the Brown & Boggs Foundry, Hamilton, Ont. . . . One year later he began his foundry apprenticeship with Canadian Westinghouse, Hamilton, and remained there until 1929. . . . During his affiliation at Westinghouse he attended Hamilton Technical Institute and Ontario Training College for Technical Teachers and was awarded his teaching certificate in foundry work in 1929. . . . In the same year he became affiliated with W. D. Lowe Vocational School, Windsor, Ont., as foundry instructor and has remained there until the present time . . . Holds membership in the American Foundrymen's Association.

Ralph L. Lee

Nationally known speaker on the subject of employee relations, Dr. Lee presents in this issue information on *Mexican Foundries* . . . Member of the employee cooperation staff, General Motors Corp., Detroit . . . Native of Dayton, Ohio, where he received his early schooling, Dr. Lee has been associated with General Motors for twenty-three years . . . Served with Delco Light Co., Dayton, which later became the Frigidaire and Delco Products Division of the corporation . . . Advanced to assistant sales manager for Frigidaire before transferring to Detroit as assistant director of consumer research . . . Later joined the staff of vice-president in charge of sales before moving to his present position . . . Member of A.F.A. . . . Recognized authority on humanics in industrial operations, Dr. Lee is a frequent and popular speaker before A.F.A. gatherings.

G. R. Gardner

G. R. Gardner is metallurgist, Cleveland Division, Aluminum Research Laboratories, Aluminum Co. of America, Cleveland . . . He was born in Detroit . . . Attended Antioch College, Yellow Springs, Ohio . . . From 1936-38 was affiliated with Antioch Foundry Co., Yellow Springs . . . For one year (1938-39) was connected with Rolland Gardner & Co., Cleveland . . . Assumed his present position with Aluminum Co. of America in 1939 . . . Member of the A.F.A. Sand Division's Executive Committee, Core Test Committee and chairman of that division's Committee on Physical Properties of Non-Ferrous Sands at Elevated Temperatures . . . See: *Molding Sands, Physical Properties* . . . Reports goal of laboratory sand testing is to obtain maximum control over the composition and properties of sand mixtures by means of standard methods.

C. A. Carlson

Author, Carl A. Carlson has been connected with the Norton Co., Worchester, Mass., since 1913. . . . Serving company first as a mechanic, until 1922, then as a sales trainee until 1923, he assumed the position of sales engineer the following year. . . . His years of training in relation to abrasive grinding wheels has afforded him the opportunity to prepare a paper on *Foundry Grinding Wheels, Manufacture and Use*. . . . His findings on grinding wheels have been published by members of the trade press and he has been a speaker before a number of American Foundrymen's Association chapters on the subject of grinding wheels and their relationship to finishing operations . . . Member of American Foundrymen's Association.

R. A. Quadt

Research metallurgist, American Smelting & Refining Co., Barber, N.J. . . . Mr. Quadt wrote *Aluminum Sand Casting Alloys, Effect of Room Temperature Intervals Between Quenching and Aging*. . . . A 1939 graduate of Rutgers University, New Brunswick, N.J. . . . Has written for both the trade press and technical societies, papers have dealt with aluminum . . . Holds membership in American Institute of Mining and Metallurgical Engineers, American Society for Metals and American Foundrymen's Association.

A.F.A. CHAPTER DIRECTORY

BIRMINGHAM DISTRICT CHAPTER
Secretary-Treasurer—Fred K. Brown, Adams, Rowe & Norman, Inc., 729 Brown-Marx Building, Birmingham, Ala.

BRITISH COLUMBIA CHAPTER
Secretary-Treasurer—L. P. Young, A-1 Steel & Iron, Foundry Ltd., Vancouver.

CANTON DISTRICT CHAPTER
Secretary—C. B. Williams, Massillon Steel Castings Co., Massillon, Ohio.

CENTRAL ILLINOIS CHAPTER
Secretary—George H. Rockwell, Caterpillar Tractor Co., Peoria, Ill.

CENTRAL INDIANA CHAPTER
Secretary—Robert Langsenkamp, Langsenkamp-Wheeler Brass Works, 1234 Shelby Ave., Indianapolis.

CENTRAL MICHIGAN
Secretary-Treasurer—Fitz Coghlin, Jr., Albion Malleable Iron Co., Albion.

38

CENTRAL NEW YORK CHAPTER
Secretary—C. M. Fletcher, 111 Prospect St., Endicott, N. Y.

CENTRAL OHIO CHAPTER
Secretary—Karol Whitlatch, 439 Richardson Ave., Columbus, Ohio.

CHESAPEAKE CHAPTER
Secretary-Treasurer—L. H. Denton, Baltimore Convention Bureau, 1714 O'Sullivan Building, Baltimore 2, Md.

CHICAGO CHAPTER
Secretary—John C. Lunkes, Velsicol Corp., 120 E. Pearson St., Chicago, Ill.

CINCINNATI DISTRICT CHAPTER
Secretary—Earl F. Kindinger, Williams & Co., Inc. 1921 Dunlap, Cincinnati 14, Ohio.

DETROIT CHAPTER
Secretary—R. E. Cleland, Eastern Clay Products, Inc., 510 United Artists Building, Detroit 26.

EASTERN CANADA AND NEWFOUNDLAND CHAPTER
Secretary—Robert E. Cameron, 257 Metcalf Ave., Westmount, Que., Canada.

METROPOLITAN CHAPTER
Secretary—J. F. Bauer, Hickman, Williams Co., 70 Pine St., New York 5.

MEXICO CITY CHAPTER
Secretary—N. S. Covacevich, Casa Covacevich Foundry Supplies & Equipment, Mexico City, D. F., Mexico.

MICHIANA CHAPTER
Secretary—V. S. Spears, American Foundry Equipment Co., 2013 Linden Ave., Mishawaka, Ind.

NORTHEASTERN OHIO CHAPTER
Secretary—Gilbert J. Nock, Nock Fire Brick Co., 1243 E. 55th St., Cleveland 14.

NORTHERN CALIFORNIA CHAPTER
Secretary—J. Fred Aicher, 116 New Montgomery St., 339 Rialto Building, San Francisco 5.

NORTHERN ILLINOIS-SOUTHERN WISCONSIN CHAPTER
Secretary—Herb Bauman, Ebaloy, Inc., Rockford, Ill.

NORTHWESTERN PENNSYLVANIA CHAPTER
Secretary—Harry L. Gebhardt, United Oil Mfg. Co., 232 W. 21st St., Erie, Pa.

ONTARIO CHAPTER
Secretary—G. L. White, Westman Publications, Ltd., 137 Wellington St., Toronto, Ont., Canada.

OREGON CHAPTER
Secretary—F. A. Stephenson, Dependable Pattern Works, 1634 S.E. 7th Ave., Portland 14, Ore.

PHILADELPHIA CHAPTER
Secretary-Treasurer—W. B. Coleman, W. B. Coleman Co., 9th & Rising Sun Ave., Philadelphia 40.

QUAD CITY CHAPTER
Secretary-Treasurer—Ray Marthens, Marthens Co., 1205 4th Ave., Moline, Ill.

ROCHESTER CHAPTER
Secretary-Treasurer—Leon C. Kimpal, Rochester Gas & Electric Corp., 89 East Ave., Rochester 4, N. Y.

ROCKY MOUNTAIN EMPIRE CHAPTER
Secretary—Chas. E. Stull, Manufacturers Foundry Corp., Denver, Colo.

SAGINAW VALLEY CHAPTER
Secretary-Treasurer—F. S. Brewster, 2008 Third St., Bay City, Mich.

ST. LOUIS DISTRICT CHAPTER
Secretary—Robert E. Woods, Warren Coke Co., 607 Laclede Building, St. Louis 1.

SOUTHERN CALIFORNIA CHAPTER
Secretary—L. O. Hoffstetter, Brumley-Donaldson Co., Box 336, Vernon Station, Los Angeles 11.

TEXAS CHAPTER
Secretary-Treasurer—H. L. Wren, 629 M & M Building, Houston, 2.

TOLEDO CHAPTER
Secretary-Treasurer—Emmett E. Thompson, 1723 Perth St., Toledo, Ohio.

TRI-STATE CHAPTER
Secretary—Charles A. McNamara, Jr., Big Four Foundry Co., Inc., 621 East Cameron, Tulsa, Okla.

TWIN CITY CHAPTER
Secretary-Treasurer—Alexis Caswell, Manufacturers' Association of Minneapolis, Inc., 100 Metropolitan Building, Minneapolis 2.

UNIVERSITY OF MINNESOTA STUDENT CHAPTER

WASHINGTON CHAPTER
Secretary-Treasurer—A. D. Cummings, Western Foundry Sand Co., Seattle.

WESTERN MICHIGAN CHAPTER
Secretary—V. A. Pyle, Pyle Pattern & Mfg. Co., 1201 Sanford St., Muskegon Heights, Mich.

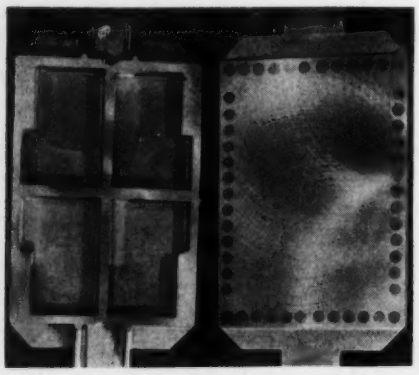
WESTERN NEW YORK CHAPTER
Secretary—Leo A. Merryman, Tonawanda Iron Corp., Box 198, N. Tonawanda, N. Y.

WISCONSIN CHAPTER
Secretary—Robert C. Woodward, Bucyrus-Erie Co., So. Milwaukee, Wis.

NEW PRODUCTS

Cope and Drag Set

Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, has developed a master cope and drag plate set for jolt stripper or jolt roll-over molding machines. Cast aluminum and, ground to close tolerances, tough steel buttons are integrally cast in along the flask line, greatly reducing flask wear. Buttons cannot be loosened by jarring; if wear results, the plates can be reground easily, and restored to original efficiency. These plates are available in a variety of sizes.



Carbide Burs

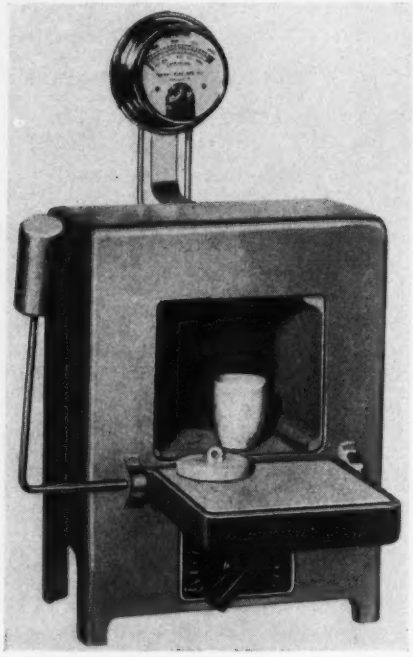
The Atrax Co., 240 Day St., Newington 11, Conn., has brought out a line of ¼-in. carbide burs on ⅛-in. heat treated shanks. Machine ground to exact predetermined design and helix, rake, depth of flute, fillet and finish are precisely controlled. Burs available in nine different shapes.

Pyrometer Controller

Taco West Corp., 2620 So. Park Ave., Chicago, presents a two position electronic controller. Control pointer is set at the desired temperature and control is immediately established within an exceptionally narrow temperature range. Relay is built in and has a load capacity of 3 Kw non-inductive. Electronic circuit requires no tuning or other adjustments. Control mechanism unaffected by line voltage variation, surge effects or other changes. Instrument measures 7⅛-in. by 5¾-in. by 5¼-in. Flush or surface mounted.

Electric Furnace

Thermo Electric Mfg. Co., Dubuque, Iowa, has advanced a new electric furnace that features stepless heat control. Any desired temperature between 500 and 1850 F. can be selected and automatically maintained. Model GTP has inside dimensions as follows: 4-in. wide, 3¾-in. high and 3¾-in. deep. Equipped with pyrometer calibrated in both Fahrenheit and Centigrade. Heating element is coiled from heavy gauge alloy, and is embedded in the sides, top and bottom of the heating chamber. This construction provides better protection for the heating element and more uniform distribution of heat. Unit weighs 15½ lb. Either 115 volts AC or 230 volts DC.



Welding Flux

All-State Welding Alloys Co., Inc., 96 West Post Road, White Plains, N. Y., announces the availability of a paste cast iron flux for gas welding. Paste flux is painted on the clean surface of the cast iron while the casting is cold. Welding rod may also be painted with flux in order to provide additional flux as the work progresses. Used in the repair of broken castings, salvage of defective castings and various uses.

Boring Head

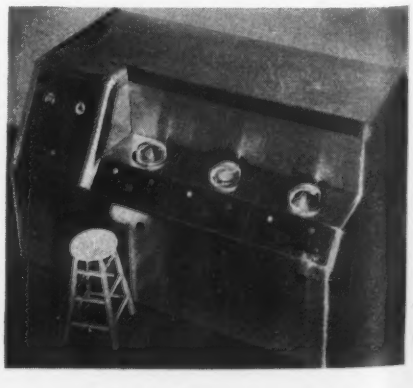
Kaukauna Machine Corp., Kaukauna, Wis., presents for repetitive boring operations a new boring tool. Without changing cutter bits, it is possible to rough, semi-finish and finish bore. Boring head is mounted on an eccentric arbor and indexed for individual cuts. Uniformity of bore size is constantly assured for the boring head is firmly locked in accurate position after each indexing.

Sprayer

K. & F. Metal Spray Industries, 11204 Charlevoix Ave., Dept. B, Detroit, presents an electric sprayer using AC or DC current. The air requirements are 3½ cubic feet per minute at 30 to 40 lb. pressure. Temperature control is adjustable from 100 to 600 F. and maintained within 1/10 of a degree. The entire unit is securely sealed within a brass shell free from dust, dirt and tampering. The ni-chrome wire of the heating units is imbedded in a special refractory material completely encased in a sheath of high temperature chrome steel.

High-Vacuum Furnace

Eitel-McCullough, Inc., 1570 San Mateo Ave., San Bruno, Calif., has developed for the heat treatment of materials which are highly reactive toward gases, a new high-vacuum furnace. Capable of continuous operation at temperatures in the 1800 c. region, the standard type consists of three chambers integrated into a single enclosed cubicle as illustrated. Cycling circuits are incorporated so one chamber can be in the treatment phase while one is under preliminary pumping and the third is being reloaded. Each chamber is equipped with a special high-speed oil diffusion pump capable of maintaining high vacuum during outgassing operations. Interlocking safety devices protect furnace parts against temperature extremes and heating filaments against burning out at too high a gas pressure. Consuming a total of 15 kw of power, the unit has a total treating capacity of 175 cu. in.



FORD DAY

(*Continued from Page 47*)

under the direction of R. W. Greene, production foundry superintendent, and Claude Jeter, foundry technician. They were assisted by Harry Gravlin, Robert Gardner and William Woodcock, all of the Ford Motor Company.

The exhibit consisted of three separate sections. The first, installed on a turntable, illustrated the various steps in the manufacture of cylinder block molds. The next section displayed pattern and core making equipment, and the third demonstrated the Ford way of molding automobile parts.

Following the Rouge visit, the foundrymen were taken to the Dearborn Inn for luncheon. R. H. McCarroll, Ford's director of chemical engineering and chemical and metallurgical research, presided. Included at the speakers' table were R. R. Washburn, Plainville Casting Co., Plainville, Conn.; R. W. Greene, Ford production foundry superintendent; R. A. Flinn, Jr., American Brake Shoe Co., Mahwah, N. J.; Claude Jeter; Fred J. Walls, International Nickel Co., and Honorary Chairman Detroit Convention Committee; A.F.A. National Director F. M. Wittlinger, Texas Electric Steel Casting Co., Houston; G. Vennerholm, assistant head of chemical and metallurgical research; Gordon C. Creusere, Semet-Solvay Co., and F. C. Riecks, director of the technical controls department of the foundry.

Mr. Walls addressed the group and Mr. Riecks talked on "Foundry Progress and Planning at Ford."

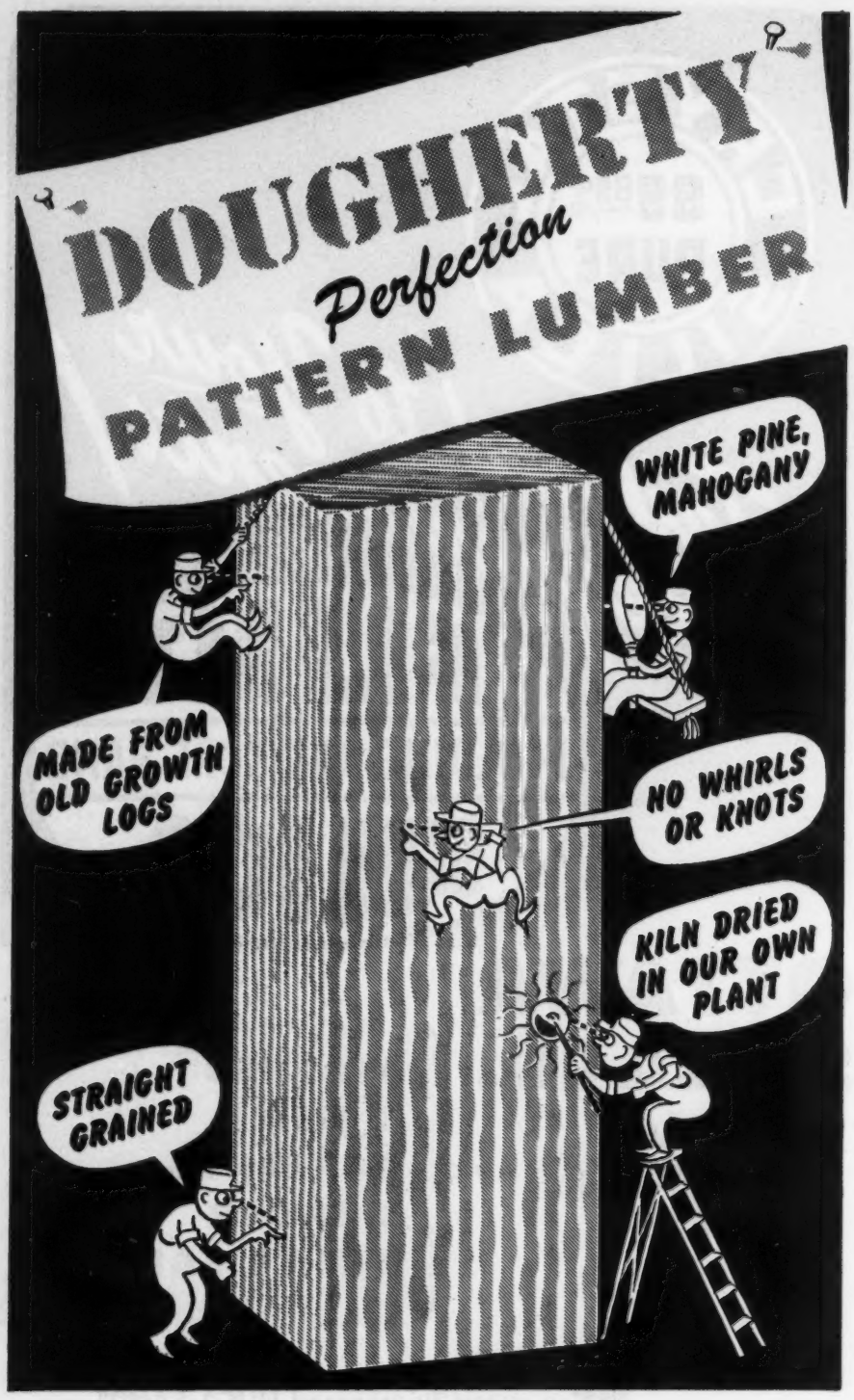
Mr. Riecks enumerated three factors that should convince all foundry managers that decisions of vital importance must be made. He listed them as follows: (1) that there is a definite increase ahead in the demand for castings of all kinds; (2) something must be done to increase worker efficiency by new mechanization so that the same plant can produce the same tonnage as expected of it prior to the war; and (3) working conditions, which have never been too good in most foundries, have been spotlighted by the press and so foundry managers face the job of proving that a foundry is a good place to work.

OTTAWA SILICA CO. offers . . .

WASHED
DRIED
SCREENED
GRADED
WHITE SANDS

Our specially prepared SILICA SANDS are available in various sizes. We have the particular grade best suited for your requirements. ¶ You will find our SANDS most suitable for cores —they save oil—they are clean, uniform and constant in quality. ¶ SILICA FLOUR, at its best, for foundry uses.

OTTAWA SILICA COMPANY
Ottawa, Illinois



Fillets, Plywood, Bottom Boards, Hardboard for templates and lagging, Dowels and Maple Mallets. Skids and Crating for large castings and machinery.

UNION WHOLESALE
YOUNGSTOWN 8, OHIO
Phone: 4-4406

DOUGHERTY
CLEVELAND 1, OHIO
WILLOW RANCH, CALIF.
Phone: Diamond 1200

KEYSTONE
PITTSBURGH 3, PA.
Phone: HEmlock 0700

LUMBER COMPANY

DIVISIONS

(Continued from Page 50)

degree in mechanical engineering from Cornell in 1933, Mr. Kyle studied for a year at Lehigh University, Bethlehem, Pa., then went to Massachusetts Institute of Technology, Cambridge, as an instructor in mechanical engineering.

At M.I.T. he was assistant professor of mechanical engineering in 1938 and associate professor in 1944. He received his Master of Science degree in 1939. In 1946 he joined the faculty of Cornell University as professor of applied metallurgy.

With A.F.A. he has been chairman of the course committee of the cooperation with engineering schools group, head of the flowability of molding sand subcommittee and other sand-investigating bodies, and representative of the association on the joint committee on foundry education.

He has been active in other scientific groups, including the American Society of Mechanical Engineers and ASM.

L. H. Hahn

Laurence H. Hahn was born in Reedsburg, Wis., and received his college education at University of Wisconsin.

He stayed on, after graduation with a Bachelor of Science degree in 1921, and received his master's in 1922. In that year he joined Sivyer Steel Casting Co. at Milwaukee as an apprentice. He advanced to sales engineer in 1924 and served in that capacity until 1932, after which he spent a year each in the melting department, foundry supervision and metallurgical research.

Transferred to the firm's Chicago plant as metallurgist in 1935, Mr. Hahn was named metallurgical supervisor there and melting superintendent for both plants in 1939.

Active in the Chicago chapter of A.F.A. for a number of years, he was president for 1946-47.

Charles Locke

Charles Locke was born in Philadelphia and went to Michigan College of Mining and Technology, Houghton, for his Bachelor of Science degree in metallurgy (1936) and received his degree of Master of Science from Rensselear Polytechnic Institute, Troy, N. Y., in 1937.

For the following year he was assistant metallurgist at Dodge Steel Co., Philadelphia; and in 1938 he began his association with West Michigan Steel Foundry Co., as metallurgist. He was appointed chief metallurgist in 1938 and given the additional duties of general superintendent this year.

A member of the A.F.A. steel division's committee on methods of producing steel for castings since 1944, Mr. Locke is also active in the Western Michigan chapter and has served as program chairman for that group.

He holds membership, also, in AIME, in which he serves on the electric furnace steel conference committee; the ASM, SAE, and Steel Founders Society of America, and is a member of the research committee of the steel founders' group.

QUAD CITY

(Continued from Page 64)

Chapter Board of Directors, President Wood addressed the membership at the evening meeting, the last of the current season, at which Chairman Humphrey presided.

Vice-Chairman Swartz introduced the President, who spoke at length on the great personal benefit derived from playing an active part in the various A.F.A. projects.

"You men of the foundry occupation," he declared, "have in this work a fine opportunity to improve your knowledge of foundry practice and at the same time broaden your views on the castings industry as a place to work. Take pride in your jobs, for the foundry field is absolutely basic to all industries and offers every man in it a splendid opportunity to advance himself, his company and his chosen field."

Secretary Maloney reported on the recent 51st Annual Meeting in Detroit and urged those interested to offer their services for technical committee work during the year ahead. He called attention to the valuable information in published A.F.A. literature, representing the combined knowledge and experience of many of the industry's most outstanding metallurgists and foundry operators.

Mr. Swartz introduced the speaker's table guests, including Geo. W. Cannon, Campbell Wyant & Cannon Foundry Co., Muskegon, Mich., and L. R. Clausen, J. I. Case Co., Racine, Wis.

Turns Over Gavel

In the business meeting that followed, Chairman Humphrey turned the gavel over to the newly elected Chairman, R. H. Swartz, who announced the following committee chairman appointments: Program—Martin Liedtke, International Harvester Co., Rock Island, and R. E. Wilke, Deere & Co., Moline; Membership—W. E. Jones; Entertainment—C. L. Briceland, J. I. Case Co., Bettendorf; Attendance—John S. Morrow, Deere & Co.

Concluding the program, a splendid sound film of the wartime Ordnance Steel Foundry Co., Bettendorf, was shown, depicting a completely modern and highly mechanized foundry in operation.

Low Cost Mulling!

the MULBARO

IT'S REALLY PORTABLE

• Here's the *only* portable mullor—the *only* versatile mullor! Ideal for regular or special batches in a small or large foundry. Low initial cost—economical in operation!

Available in two sizes—3½ cu. ft. and 7 cu. ft. batch capacity.

Synthetic sand or natural molding sand (facings) mulled with efficiency and thoroughness.

Core sand uniformly mixed with oils—then wheeled direct to benches

B&P

JUST fill the Mulbaro's barrow with sand and lower the mulling mechanism—the rubber-covered mullor wheels and steel plow assembly have proven to provide the ultimate in distribution of additions and mulling results. A real mulling job done fast, at lowest cost. When mulled, the sand is in its container, ready for delivery. Write for catalog.

THE BEARDSLEY & PIPER COMPANY

General Offices: 2424 N. Cicero Avenue Plant: 2541 N. Keeler Avenue
Chicago 39, Illinois

IT'S A B&P PRODUCT! SANDSLINGER • SPEEDSLINGER • SPEEDMULLOR • MULBARO • SCREENARATOR • SAND CONDITIONING MACHINE • CHAMPION SPEED-DRAW

"for Better Melting"

This is not just a tricky catch phrase. It's what you get when you use Semet-Solvay Foundry Coke in your cupolas. What is "better melting?" It's melting your iron *hotter, faster, cleaner.*

SEMET-SOLVAY COMPANY

BUHL BUILDING
Detroit 26, Mich.

GENESEE BUILDING
Buffalo 2, N. Y.

DIXIE TERMINAL BUILDING, Cincinnati 2, Ohio

Canadian Sales Agent: Standard Fuel Co., Ltd., Toronto

Semet-Solvay Foundry Coke

for Better Melting

HIGH SPEED SNAGGING

Get on with production. Do your snagging quicker, cleaner, *safer!* With Electro HIGH SPEED SNAGGING WHEELS *engineered to your job,* you'll see costs come down and volume of *better output* go up. These wheels work *on* anything *from* anything—swing frames, floor stands or portable machines. Full details illustrated in full color in our new Grinding Wheel Manual No. 645. Send for it *now.* It's *free.*

Service from Los Angeles or Buffalo

Electro SINCE 1919

K-335A

Electro REFRACTORIES & ALLOYS CORPORATION

MFRS. • REFRACTORIES • (High Speed GRINDING WHEELS) • CRUCIBLES • ALLOYS

344 DELAWARE AVENUE BUFFALO 2, NEW YORK

PERSONALITIES

(*Continued from Page 63*)

W. J. Campbell, welding engineer with General Electric Co., has been assigned to duties as an arc welding specialist in the southeastern district, with headquarters in Atlanta, Ga. In the new position, he will cover the states of Alabama, North and South Carolina, Florida, Georgia, Mississippi, and part of Louisiana.

Homer Parsons

J. A. Wotherspoon, formerly general manager, Imperial Iron Corp., St. Catharines, Ont., has left the firm to become associated with Bibby Foundry, Galt, Ont., as a partner. One of the most active members of Ontario A.F.A. chapter, Mr. Wotherspoon served as its Chairman for 1946-47.

C. F. Yarham recently joined the staff of Ohio Equipment Co., Cleveland. Formerly associated with Euclid Road Machinery Co., Cleveland, he is a licensed engineer with a background in application-engineering of modern handling equipment. In his new position, Mr. Yarham will specialize in mobile materials handling machinery.

D. S. Ferree has been named district manager at the new Philadelphia sales offices of the Falk Corp., Milwaukee.

Walter Geist was named to a sixth term as president, Allis-Chalmers Mfg. Co., Milwaukee, at the recent annual meeting of stockholders and directors. All other directors and officers of the firm were re-elected.

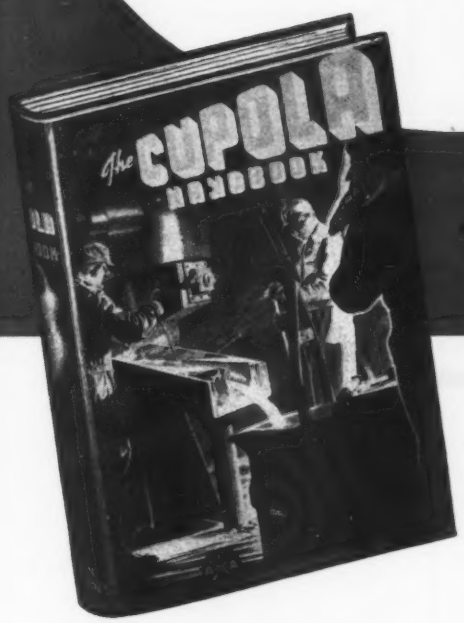
E. C. Hoenicke, S. G. Keywell and **P. T. Farrell,** all of Detroit, have been appointed to the regional Steel, Foundry and Scrap Industries Committee, one of 35 groups cooperating with the War Assets Administration in expediting scrap sales. They are, respectively, general manager, Foundry Div., Eaton Mfg. Co.; president, Samuel G. Keywell Co., and director of purchases, Great Lakes Steel Corp.

H. W. Stull has been appointed director of personnel, a newly-created position, Mathieson Alkali Works, New York. Graduate of Pennsylvania State College and George Washington University law school, he has been head of the firm's legal department since 1940, and executive assistant to the president since 1946.

(*Concluded on Page 90*)

THE FIRST COMPLETE REFERENCE BOOK FOR CUPOLA OPERATIONS

Cupola OPERATIONS HANDBOOK



complete and up-to-date reference book on Cupola Operation in all its phases. A total of **128** outstanding foundry metallurgists and cupola operators have contributed to this Cupola Operations Handbook.

Highlights include: Operation of the Cupola, The Refractory Lining, Blowing Equipment and Blast Control Equipment, Forehearth and Receiving Ladles, Blast Conditioning, Classification of Scrap for Cupola Mixtures, Foundry Coke, Cupola Slags, Fluxes and Fluxing, and Fundamental Thermo-Chemical Principles Applicable to Cupola Operation.

First edition—cloth bound . . . **468** pages . . . **188** graphs and illustrations . . . **34** tables . . . extensive bibliographies and index.

Order your copy direct from A.F.A. Headquarters. Fill in and mail the convenient order form today.

PRICE

$4.50 to members

$5.50 to non-members

AMERICAN FOUNDRYMEN'S ASSOCIATION
222 W. ADAMS ST.
CHICAGO 6, ILL.

Please send ____ copies of "Cupola Operations Handbook"

☐ Remittance enclosed. ☐ Send invoice.

Name

Company

Street Address

City P.O. Zone State

Indicate whether home or office.

ORDER "National" BRAND

HIGHEST QUALITY FOUNDRY BENTONITE

Prompt shipment—unlimited quantities of high grade bentonite now available to foundries from BAROID—the world's largest producer of bentonite. Our plants are geared to meet every requirement of the foundry trade.

Order "NATIONAL" Brand

BAROID

SALES DIVISION

NATIONAL LEAD COMPANY

BENTONITE SALES OFFICE

Railway Exchange Building • 80 East Jackson Blvd.
Chicago 4, Illinois • Telephone HArrison 8697

DISTRIBUTORS IN PRINCIPAL CITIES

HANDY INFORMATION ON

CENTRIFUGAL CASTING

For the Busy Executive and Practical Shop Man

208 Pages of information. The papers of fourteen authors as presented at A.F.A. conventions since 1935.

- In this volume are the freely contributed ideas of the men of ten well known companies who have spent millions in research and investigation.
- Will provide the busy executive with much information about this rapidly expanding casting method.
- Will help the practical shop man solve his centrifugal casting problems.
- Price: A.F.A. members, $2.00.

CONTENTS:

1. Twelve articles. 2. Fourteen authors of outstanding ability. 3. Practical and theoretical aspects of centrifugal casting:

Steel
Gray Iron
Non-Ferrous Metal

4. Pictures, charts and diagrams. 5. Discussions which took place when the papers were presented.

AMERICAN FOUNDRYMEN'S ASSOCIATION

222 West Adams Street - : - Chicago 6, Illinois

PERSONALITIES

(*Continued from Page 88*)

M. D. Austin was recently appointed assistant to L. D. Bigelow at the Chicago office of Hewitt Rubber Div., Hewitt-Robins, Inc., New York. Recently district manager in Indianapolis. Mr. Austin has a background of 13 years in industrial rubber good sales.

R. C. Cady has been appointed manager of the materials handling division, Ajax Flexible Coupling Co., Inc., Westfield, N.Y.

K. C. Brownell, executive vice-president, American Smelting & Refining Co., was elected vice-president and member of the executive committee of the board of the Lead Industries Association at its annual meeting May 9. **D. N. Burruss, Jr.,** general manager, Metals Refining Co., was named a director. **R. L. Ziegfeld** was elected acting secretary-treasurer.

C. E. Bittner has been elected vice-president in charge of operations, Fairview Foundry, Poughkeepsie, N.Y., a subsidiary of the Intertype Corporation.

Obituaries

Alois M. Siess, foundry superintendent, W. S. Tyler Co., Cleveland, died April 12.

A native of Cleveland, Mr. Siess had lived there all his life. He was associated with the Tyler firm for 42 years.

Mr. Siess was an active member of Northeastern Ohio A.F.A. chapter and was also affiliated with other foundry groups.

W. C. Trout, president, Lufkin Foundry & Machine, Lufkin, Tex., whose death was reported in the May issue of AMERICAN FOUNDRYMAN.

H. Scott Cameron, president and general manager, Maritime Steel & Foundries, Ltd., New Glaskow, N.S., died in Montreal, Que., Canada, April 27.

Peter Hinkens, 72, president, Butler Street Foundry & Iron Co., Chicago, died May 11.

Harry Rubovitz, president, Newark Pattern Works, Newark, N.J., died recently.

Born in Austria-Hungary in 1878, Mr. Rubovitz came to the United States in 1882. He organized the Newark Pattern firm in 1907 and served as its president from that time until his death.

During the last war, Mr. Rubovitz had a prominent part in the engineering of pattern equipment for the production of castings for the aircraft industry.

CHARLES C. KAWIN CO.

ANALYTICAL SERVICE

Chemical and Physical Tests of all Ferrous and Non-ferrous metals

ENGINEERING SERVICE

Consulting and Advisory Metallurgical and Foundry Engineering

METALLOGRAPHIC SERVICE

Photomicrographs, Grain Size, etc. on all Ferrous and Non-ferrous Metals

KAWIN

CHICAGO 5, ILLINOIS
431 S. Dearborn Street

BUFFALO 2, NEW YORK
110 Pearl Street

HIGH SILICON IRON

JISCO

SILVERY

The choice of Foundries who demand the best.

"Jisco" Silvery is a "must" in the modern foundry. Its use means better castings at lower cost. It supplies the needed silicon.

Full information upon request.

- VIRGIN ORES
- LADLE MIXED
- MACHINE CAST

THE JACKSON IRON & STEEL CO.
JACKSON, OHIO

CHAPTER ACTIVITIES

(Continued from Page 79)

dens, International Harvester Co., Indianapolis.

The speaker explained the nature of the plastic coating and described techniques of its application in castings production.* Control is a critical factor in the use of this new material, he told the foundrymen, adding that experiments in control methods are going forward at the present time.

* See "New Process Chemically Treats Molding Sand," by T. W. Curry, in this issue.

Northwestern Pennsylvania

J. E. Gill
Lake Shore Pattern Works
Chapter Director

INOCULATION was described to members and guests of Northwestern Pennsylvania chapter as "a valuable tool with which the foundryman can increase the casting characteristics of gray iron without altering the chemical composition of the melt" by T. E. Barlow, Battelle Memorial Institute, Columbus, Ohio, technical speaker at the March 24 meeting in the Moose Club, Erie.

Discussing "Practical Inoculation of Gray Iron," Mr. Barlow pointed out that it is not a cure-all for bad melting practice—but is a good method to use in maintaining a uniform, high quality of casting. He demonstrated the metallurgical effect of careful inoculation through a series of slides.

Chapter Chairman E. R. Strick, Erie Malleable Iron Co., presided.

At the May meeting of the chapter, election of officers and directors was the first order of business.

J. W. Clarke, General Electric Co., Erie, Vice-Chairman for the past season, was named Chairman.

Elected Vice-Chairman was J. S. Hornstein, Meadville Malleable Iron Works, Meadville, who completes a term as Director this year.

Chapter Secretary H. L. Gebhardt, United Oil Mfg. Co., Erie, was re-elected and J. A. Shuffstall, National Erie Corp., Erie, was chosen as Treasurer for 1947-48.

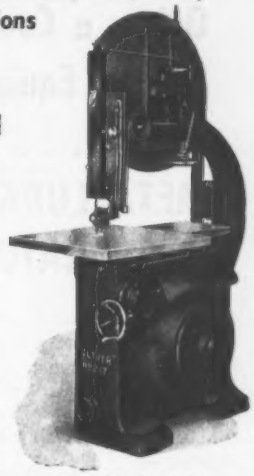
Directors elected to serve until 1950 are B. D. Harrington, Hickman-Williams Co.; H. L. Zwicker, American Sterilizer Co., and F. P. Volgstadt, Griswold Mfg. Co.

"OLIVER"

30-inch Metal Cutting

BAND SAW

Cuts risers, gates, sprues, heavy and light sections of metals, sheet metals. Also wood and compositions.



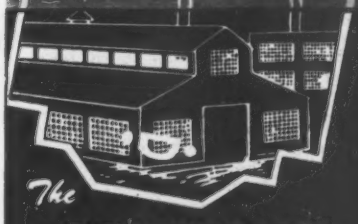
Available with slow speeds. A powerful, sturdy band saw that cuts true and steady. Ball bearing disk wheels machined to a fine running balance. Demountable rims with rubber tires.

Write for Bulletin 217-S

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

USE

SCIENTIFIC Pressure Cast MATCH PLATES



The SCIENTIFIC CAST PRODUCTS Corp

1388-1392 EAST 40th STREET
CLEVELAND 3, OHIO

2520 WEST LAKE STREET
CHICAGO 12, ILLINOIS

Buehler

Offers a Complete Line of Equipment for the . . . METALLURGICAL LABORATORY

Buehler specimen preparation equipment is designed especially for the metallurgist, and is built with a high degree of precision and accuracy for the fast production of the finest quality of metallurgical specimens.

1. No. 1315 Press for the rapid moulding of specimen mounts, either bakelite or transparent plastic. Heating element can be raised and cooling blocks swung into position without releasing pressure on the mold.

2. No. 1210 Wet power grinder with ¾" hp. ball bearing motor totally enclosed. Has two 12" wheels mounted on metal plates for coarse and medium grinding.

3. No. 1000 Cut-off machine is a heavy duty cutter for stock up to 3½". Powered with a 3 hp. totally enclosed motor with cut-off wheel, 12" x 3/32" x 1-1/4".

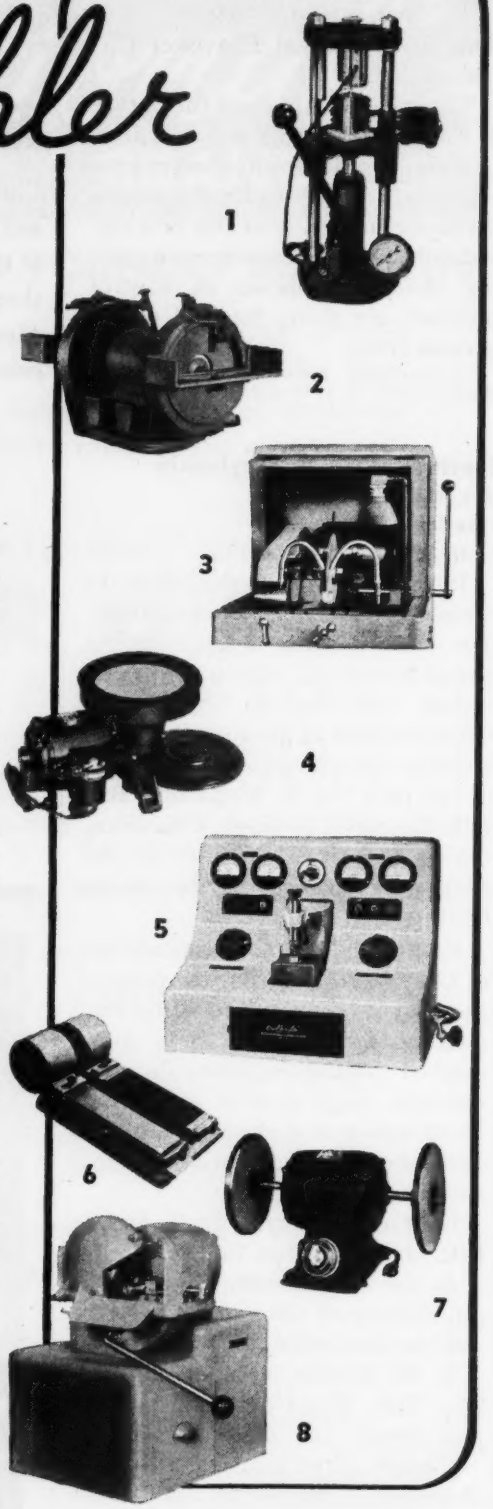
4. 1505-2AB Low Speed Polisher complete with 8" balanced bronze polishing disc. Mounted to ¼ hp. ball bearing, two speed motor, with right angle gear reduction for 161 and 246 R.P.M. spindle speeds.

5. No. 1700 New Buehler-Waisman Electro Polisher produces scratch-free specimens in a fraction of the time usually required for polishing. Speed with dependable results is obtained with both ferrous and non-ferrous samples. Simple to operate—does not require an expert technician to produce good specimens.

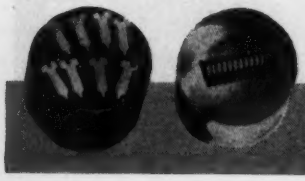
6. No 1410 Hand Grinder conveniently arranged for two stage grinding with medium and fine emery paper on twin grinding surfaces. A reserve supply of 150 ft. of abrasive paper is contained in rolls and can be quickly drawn into position for use.

7. No. 1400 Emery paper disc grinder. Four grades of abrasive paper are provided for grinding on the four sides of discs, 8" in diameter. Motor 1/3 hp. with two speeds, 575 and 1150 R.P.M.

8. No. 1015 Cut-off machine for table mounting with separate unit recirculating cooling system No. 1016. Motor 1 hp. with capacity for cutting 1" stock.



The Buehler Line of Specimen Preparation Equipment includes . . . Cut-off Machines • Specimen Mount Presses • Power Grinders • Emery Paper Grinders • Hand Grinders • Belt Surfacers • Mechanical and Electro Polishers • Polishing Cloths • Polishing Abrasives.

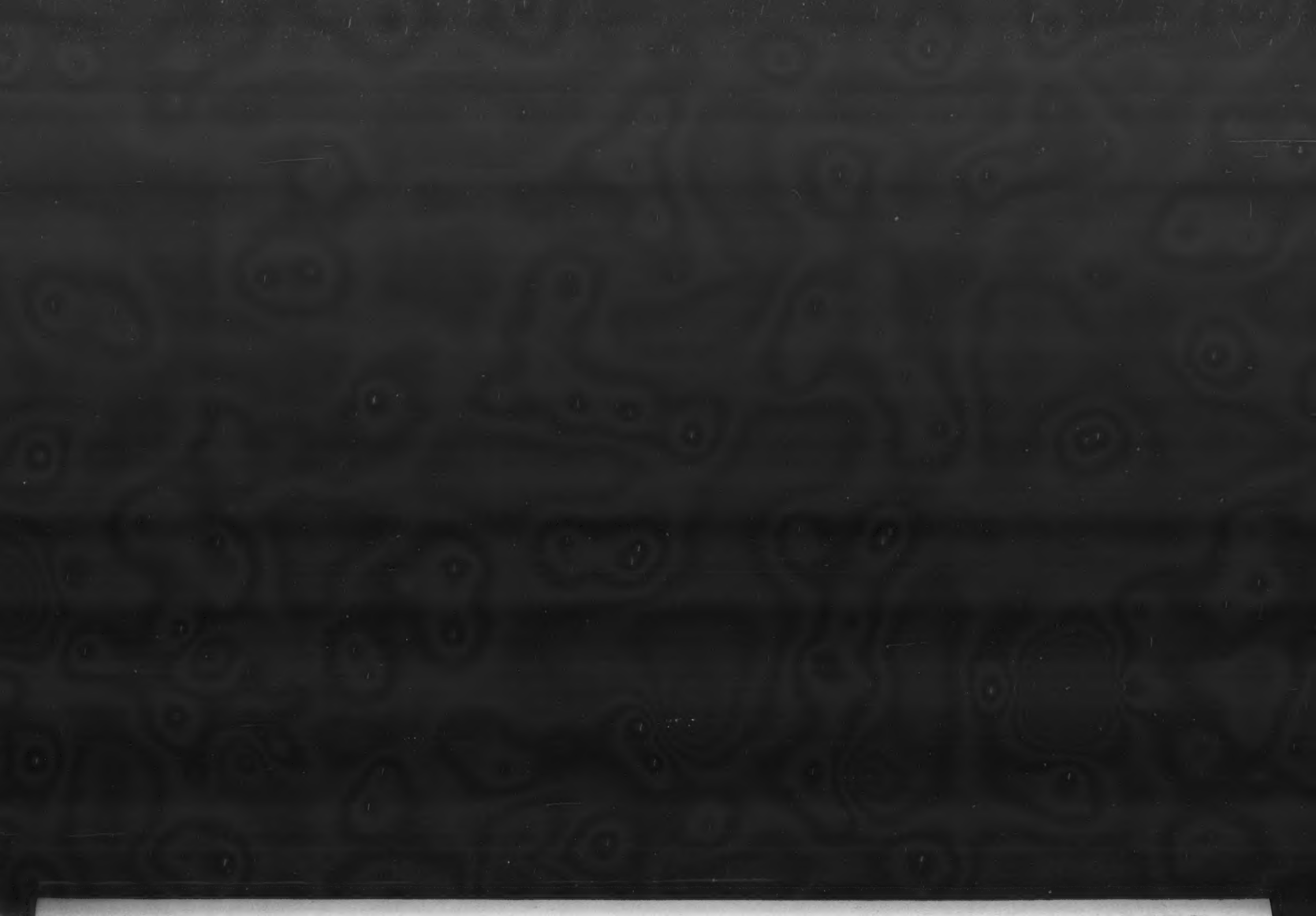


Buehler Ltd.

A PARTNERSHIP

METALLURGICAL APPARATUS

165 WEST WACKER DRIVE CHICAGO 1, ILLINOIS

Index to Advertisers

Ajax Metal Co. 16
Baroid Sales Div., National Lead Co. . . . 90
Beardsley & Piper Co. . . . 87
Blaw-Knox Co. 91
Bohn Aluminum & Brass Corp., Aluminum Refiners Div. . 13
Bohn Aluminum & Brass Corp., Michigan Smelting & Refining Div. 4
Buehler Ltd. 94
Cleveland Flux Co. . . . 2
Delta Oil Products Co. . . 5
Dietert, Harry W., Co. . . . 10
Dougherty Lumber Co. . . 84
Eastman Kodak Co. . . . 85
Electro Metallurgical Co. . . 8
Electro Refractories & Alloys Corp. 88
Federated Metals Div., American Smelting & Refining Co. 18
International Nickel Co. . . 11
Jackson Iron & Steel Co. . . 93
Kawin, Chas. C., Co. . . . 93
Keokuk Electro-Metals Co. . 6
Kirk & Blum Mfg. Co. . . . 9
Knight, Lester B., & Associates, Inc. 12
Krause, Chas. A., Milling Co. 95
Lavin, R., & Sons, Inc. . . . 91
Modern Equipment Co. Cover IV
National Engineering Co. . 1
Oliver Machinery Co. . . . 93
Ottawa Silica Co. 83
Peninsular Grinding Wheel Co. 14-15
Penola Inc. 17
Pittsburgh Lectromelt Furnace Corp. . . . . Cover II
Schneible, Claude B., Co. . . 92
Scientific Cast Products Corp. . 93
Semet-Solvay Co. 88
Smith, Werner G., Co. . Cover III
Tonawanda Iron Corp. . . 96
Velsicol Corp. 7
War Assets Admin'stration . . 19
Wheland Co. 20